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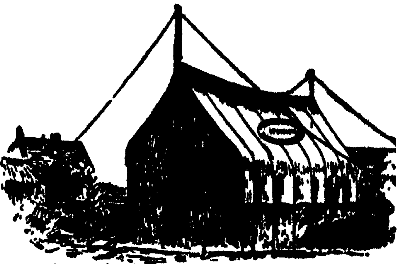

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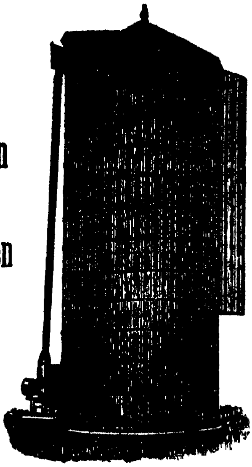

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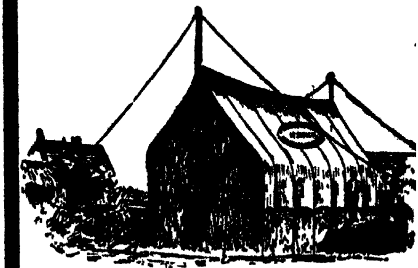

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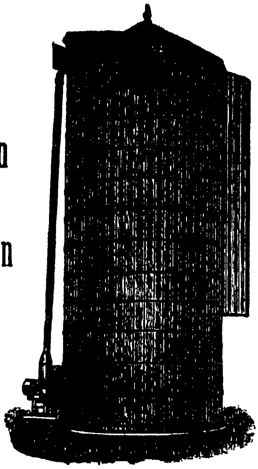

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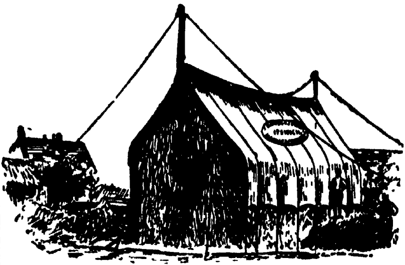

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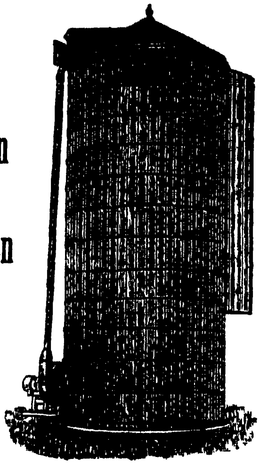

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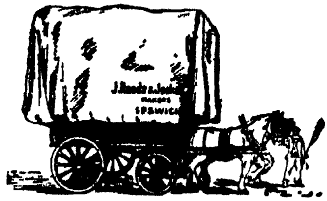

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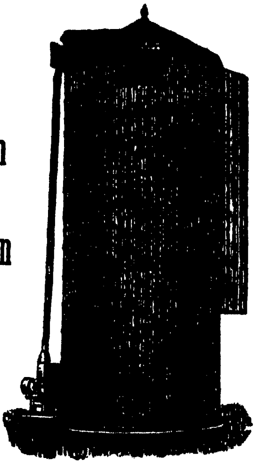

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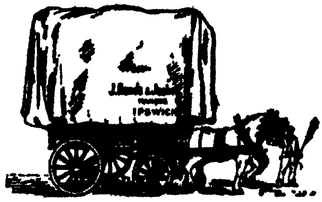

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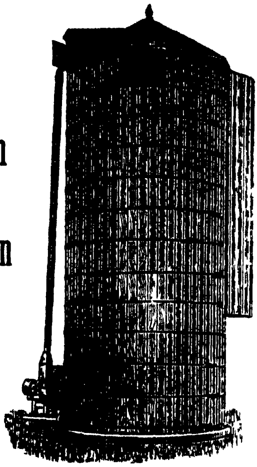

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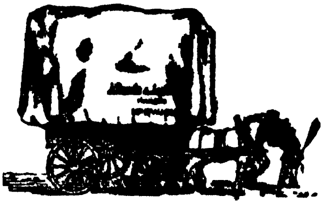

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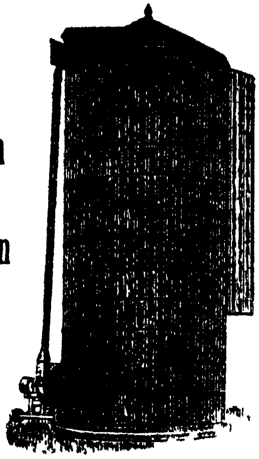

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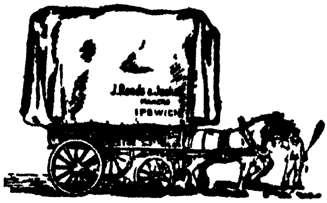

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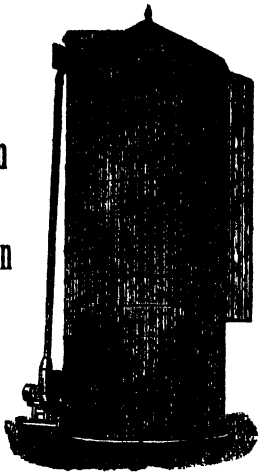

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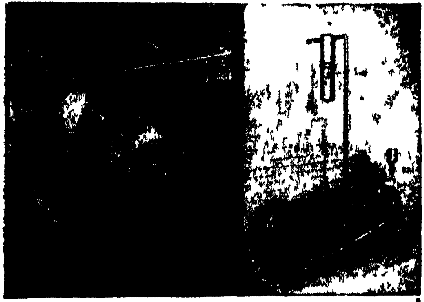

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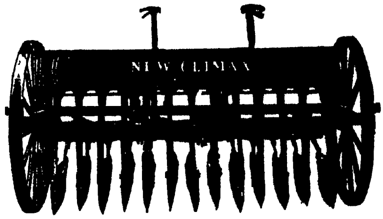

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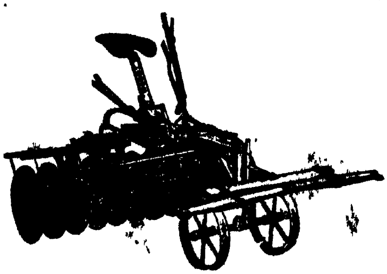

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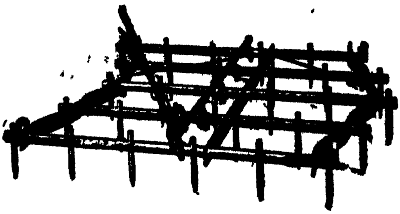

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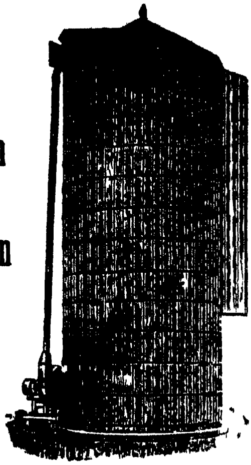

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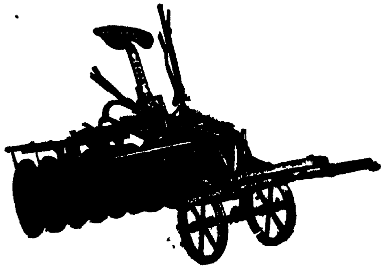

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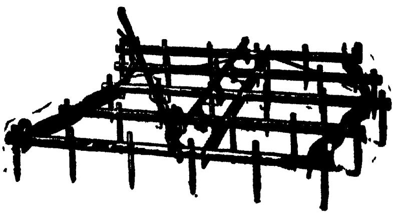

SPIKE TOOTH HARROW.

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THE JOURNAL
OF THE
BOARD OF AGRICULTURE
Vol. XXIV. No. 1.
APRIL, 1917

AGRICULTURAL RECONSTRUCTION.

IN August, 1916, the Prime Minister appointed a Sub-Committee of the Reconstruction Committee, with the following terms of reference: " Having regard to the need of increasing home-grown food supplies in the interest of national security, to consider and report upon the method of effecting such increase." In November, Lord Crawford, the late President of the Board of Agriculture and Fisheries, asked the Agricultural Policy Sub-Committee (as it was called) to consider the propriety of making an interim report upon those aspects of the question which require legislation,* and a Report [Cd. 8506, 3*d.*], which forms the subject of the present article, was submitted in reply at the end of January, 1917.

Need for a New Agricultural Policy.—The Sub-Committee say that by the adoption of a complete policy by the State, and by consistent persistence in it, a large proportion of the food-stuffs imported into this country could be produced in the United Kingdom, and a large addition might be made to the production of cereals and potatoes, not only without a diminution of the production of milk and meat but with an actual accompanying increase of that production.

While in the normal development of agricultural practice considerable increases in agricultural output would result from education, better varieties of seed, greater diffusion of good stock and improved manuring, the results would take time and be limited in degree; and since very substantial increases are essential a bolder policy is required.

The Sub-Committee state their policy in the following words: " The general average of farming must be steadily " and continuously raised throughout the United Kingdom;

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* Various legislative provisions designed to carry into effect the Government's agricultural policy are before Parliament as the "Corn Production Bill."

"the grass land and the arable land alike must be more intensively cultivated; the improvement of live stock, for which landowners and farmers have done so much even through the years of acute depression, must be progressive; much grass land must be reconverted into arable; the sugar beet industry and the manufacture of potato products can be introduced into British agriculture to its great advantage; estates must be managed with a single eye to maximum production; capital must be attracted to the industrial equipment and improvement of the land and to the operations of intensive farming; agricultural labourers must be provided with an adequate supply of good cottages; small holdings, both of owners and of occupiers, must be fostered to provide a 'ladder' for the agricultural labourer and for the demobilised sailors and soldiers; the organisation of agriculture must be developed; the country must be permeated with a complete system of agricultural education; the status of the departments of agriculture must be improved and their powers enlarged and reinforced by association with existing agricultural and administrative bodies, both national and local. . . . A basis of security and stability of the conditions under which agriculture is to be carried out in the future must be the foundation of the whole structure, and without it the increase of production cannot be realised."

In the first place the Sub-Committee recommend that the State should fix a minimum wage for the ordinary agricultural labourer in each county, and in the second place guarantee to the farmer a minimum price for wheat and oats. As there is probably no land in the British Islands which can grow neither wheat nor oats but can grow barley, the Sub-Committee consider that arable farming will be sufficiently safe-guarded without a guaranteed price for barley. With regard to a tariff the Sub-Committee record their opinion that, if the State, for reasons of general policy, were to adopt a tariff on manufactured goods, then a tariff corresponding in degree (with the necessary differentiations between the products of the Empire, of allied, and of other countries) should be imposed on imported foodstuffs such as dairy produce, meat, and corn, and that special consideration should be shown to the produce of the more intensive forms of agriculture (of which fruit and hops and flax may be cited as examples) where the capital invested, and the annual expenditure in cultivation, and the proportion of that expenditure on labour, are particularly large.

Agricultural Wages.—*Formation of Wage Boards.*—The Sub-Committee recommend that Wage Boards should be set up for each administrative county in Great Britain; or, if they thought it desirable, after consulting local opinion, the Government Departments concerned (which in this case should be the Boards of Agriculture) might constitute one Board for two or more administrative counties or for parts of two or more counties. It is considered that every opportunity should be given for Wage Boards in neighbouring counties to confer together, and, if they think fit, to submit joint reports. On the other hand each Board should be authorised to make different recommendations for different parts of its area, if it thinks it desirable. In some counties the wages generally paid would no doubt be found to be equal to, or more than, the minimum fixed by the Wage Board, and in these cases it would only be necessary to ensure that individual farmers did not continue to pay less than the approved minimum.

Constitution of Wage Boards.—The Wage Boards should consist of equal numbers of representatives of the agricultural employers and labourers in the area (say ten of each), with a smaller number of members (say six) appointed by the Agricultural Department concerned, by which also the chairman would, in each case, be nominated. Some of the "appointed members" and the chairman might be common to a group of Wage Boards, so that they might, in the course of time, gain wide experience of the problems to be solved, and the way in which their solution could most easily be achieved. The remaining appointed members on each Board might be persons familiar with the county, including landowners and agents. The selection of the workers' representatives will, in the agricultural industry, where the labourers are in most parts unorganised, present some difficulty; but the same difficulty has been encountered and overcome by the Board of Trade in setting up some of the existing Trade Boards, and in many, and an increasing number of cases, the workers prefer that the Board of Trade should, after inquiry, nominate their representatives rather than that they should be asked themselves to elect them.

Functions of the Wage Board.—The duty of a Wage Board should be to report to the Agricultural Department concerned that a certain weekly wage should be adopted as the minimum for ordinary agricultural labourers throughout the whole of its district, or, as already indicated, differing minima for different parts of its district. The Agricultural Department should have power to adopt the rate suggested and to give it statutory effect and to promulgate it, or to remit its report to the Wage Board for further consideration. After the rate had been promulgated, and a certain interval (say three months) had elapsed, it should become illegal for any farmer in that area to pay any workmen employed by time (unless he were specially exempted on account of age or infirmity) a lower wage than the approved minimum. It would not be possible for Wage Boards in all cases to fix the rates for harvest work or for piece work, because they have often to be varied according to the weather, the soil and the state of the crop. But it follows necessarily from the establishment of a minimum wage that the rates agreed upon between the farmers and labourers must be such as will enable an ordinary labourer doing an ordinary week's work to earn at least the legal minimum wage An old or infirm man should be paid at the general piece rate, but might earn less than the legal minimum owing to his age or infirmity. Arrangements should be made for old, infirm, and disabled workmen, of whom there are relatively large numbers employed on the land and for women and boys being paid less than the minimum time rate fixed for ordinary labourers.

The Agricultural Departments should do everything in their power to check any tendency on the part of the farmers to reduce their permanent staffs, and rely more than they do at present on securing occasional employees during the busy seasons, and so avoiding paying the minimum wage during the winter months and during spells of bad weather.

Payments in Kind and Cottage Rents.—The earnings of agricultural labourers in all parts of the United Kingdom, but more notably in certain districts, include payments in kind. Often it would not be to the advantage of the agricultural labourer if the effect of minimum wage legislation were to encourage farmers to convert these payments into cash, and the Sub-Committee think the Wage Boards should be cautious in dealing with these allowances. The Boards might be required to include in their schemes for fixing a minimum wage a scale by which any allowances in respect of milk, meal, etc., which are made to employees according to local custom, could be valued as part of the total earnings. The Sub-Committee are of opinion that the difficulty of assessing the value of allowances in kind in agricultural industry will not be beyond the capacity of the agricultural Wage Boards.

With regard to cottages, the Sub-Committee hope that an establishment of a minimum wage will gradually lead to the abandonment of the system by which an agricultural labourer receives part of his emoluments in the shape of a low-rented cottage, and they look forward to the time when every agricultural labourer who rents a cottage will pay the full economic rent, and rates, and receive such wages in cash as will enable him to do so. Since, however, for some time to come large numbers of farm servants will continue to live in cottages let to them at rents which are uneconomic, the Sub-Committee consider that in fixing minimum rates of wages, the Wage Boards should be required to calculate for a full economic rent for a good cottage being paid by the workman, and should fix the maximum amount which a farmer would be entitled to deduct from agricultural wages for such rent. In the event of a workman being housed in an inferior cottage, he would be in a position to claim a reduction in rent, and thus be compensated for his inferior accommodation by receiving a larger cash wage.

In view of the extraordinary divergence of conditions in different parts of Great Britain, and of the fact that agricultural wages are still rising, and of the unknown factor of the comparative values which will exist on the declaration of peace, the Sub-Committee disclaim the task of fixing any specific figure for a minimum wage.

Price of Wheat and Oats.—The lowest figure at which in the opinion of the Sub-Committee a guaranteed minimum price would be likely to give farmers a reasonable security against loss in growing wheat is 42*s.* per qr., and in growing oats 23*s.* per qr. These recommendations are necessarily made without certain knowledge of what will be the standard of values after the War. No period for the duration of this guarantee is suggested, because in the opinion of the Sub-Committee it can never be compatible with national security, so long as wars are possible, to deprive agriculture of the stability of cereal prices. The Sub-Committee suggest an initiatory increase of the guarantee in the first two years after the declaration of peace, their belief being that the impetus which this temporary additional guarantee will give to the policy of the plough will be well worth the risk of a temporary additional charge, should there be a drop in the after-war cereal prices.

Method of Payment under the Guarantee.—The Sub-Committee agree with the recommendation of Lord Milner's Committee, viz., that the farmer should receive the difference between the guaranteed price of a quarter of wheat (480 lb.) or of a quarter of oats (312 lb.) and the " Gazette " average price for the year in which the crop is harvested.

This system has the advantage that it leaves the grower free to dispose of his crop when he wishes in the open market, and that the State action in guaranteeing a minimum price to the farmer does not raise the cost of the produce to the consumer. At the same time the farmer is able to benefit by improvement in the quality of his produce, and by taking advantage of any fluctuations in the market price.

The Sub-Committee regard it as essential that payment should be based on (*a*) the number of quarters actually harvested, so far as this can be estimated, not on the number of acres sown, and (*b*) the whole of the farmer's production regardless of the amount consumed on the farm.

They recommend that every farmer who desires to claim the benefit of the guarantee should be required either :—

(*a*) To use a threshing machine which has been duly licensed for hire, the firm to which the machine belongs being made responsible for providing the farmer with a true certificate of the number of quarters of corn of the required weight threshed ; or

(*b*) If he does not propose to use a hired machine, to give notice to that effect to the Board or Department of Agriculture some time before harvest in order that the yield of his standing crop may be estimated by a Government valuer whose fees and expenses he should repay to the Board or Department of Agriculture. If he considered that the crop had been under-estimated he could still have resort to the test of a public threshing machine.

Any farmer desiring to claim the benefit of the guarantee should send in his certificates of threshing, or the estimate of the Government valuer, to the Board or Department of Agriculture, by which they should be checked and the sum found due be paid to the farmer.

An alternative plan which. in the long run, might easily be the cheapest, might be adopted in the place of (*b*). The Board or Department of Agriculture might, under carefully devised regulations, accept the certificate of the farmer as to the amount of wheat or oats which he had threshed on any given day when he had obtained the counter signature of some official or person of repute resident in the parish and authorised for that purpose by the Board or Department of Agriculture. If the officials of the Board or Department of Agriculture checked the threshing returns sent in by the farmers with their crop returns, and if they had the right of access, as they should have, at any time to the farm and farm premises of any farmer claiming the benefit of the guarantee, it is probable that they would soon become aware, from information acquired in the ordinary discharge of their duties, of the existence of fraud, the penalty for conviction for which should be very severe.

Effect of Guaranteed Prices on Rents.—The Sub-Committee next turn to the examination of the questions of adjusted rents and fixity of tenure. They decide against both of these. They argue (1) that the landowner finds capital as well as the farmer, and it is fair that he should get a share of any benefits resulting from a more profitable agriculture. (2) Where an uneconomic rent is paid, to secure the present occupiers in their tenure would be to make them a present of that part of the real value of the land for which the owner is not demanding a return in the shape of rent. The experience of the Sub-Committee does not lead them to expect that the average occupier would respond to such a gift by any intensification of his farming, or by increased production. Low rents have too often resulted in slack farming, and to secure the farmer in those rents would in such cases only leave him content with his unprogressive methods. (3) It will be highly desirable to attract to agriculture after the War an uninterrupted flow of capital. The rent which the landowner receives rarely represents an interest of as much as 5 per cent. on the capital invested in the industrial equipment of the land, and this includes no interest whatever on the capital value of the land itself. This is not to the advantage of agriculture or of the State, because it acts as a constant deterrent to the investment of capital in agriculture. Again, no prudent landowner would sell out stock from which a return of interest is assured, and reinvest his capital in the industrial equipment of the land, if he ran the risk of losing the whole or part of the interest which he was expecting to receive from it, by the decision of a Land Court. (4) Lastly, the Sub-Committee point out that the State would be creating a whole field of fresh difficulty and complication for itself if it inaugurated its new agricultural policy by conferring on the farmers a legal vested interest as part proprietors of their farms. If by the establishment of a Land Court a system of dual ownership in any degree were created, the State would have to deal in respect of the responsibilities of ownership with all the tenant farmers as well as with all the agricultural landowners.

Method of Securing Increased Production.—It is urged that the State must give time to all concerned to adjust themselves to the new conditions dictated by considerations of national safety, and must take every means in its power to give confidence and a sense of stability to all landowners, farmers, and agricultural labourers. The standard set before the eyes of these classes should be the highest—not to be content until the whole of the soil of the United Kingdom is producing the greatest possible return of foodstuffs or of timber. It must be clearly understood that henceforth bad farming is a danger to the State, and that the waste of good land on game or games is inconsistent with patriotism. There will be plenty of room for game or golf in moderation, but too much game, or golf links carved out of fat land, make an inroad on the production of foodstuffs which can no longer be defended. Rabbits must be recognised to be what they are—a curse to both agriculture and forestry.

When all this has been explained to them, it is advocated that landowners and farmers should be informed that they will be given reasonable opportunity to adjust themselves to the new conditions. The agricultural labourers being secured their share of profits by the institution of a minimum wage, the landowners and the farmers may be left to adjust their shares between them, and also to come to an agreement (which is essential) about the relaxation of covenants against the ploughing of grass land or of any others which tend to discourage good farming.

Survey of Agriculture.—The Sub-Committee recommend that the Boards and Department of Agriculture should be instructed to carry out a general survey of the conditions of agriculture throughout the United Kingdom, and that the utmost care should be exercised in selecting those who are to undertake the work. They recommend further that a panel of assessors should be set up for groups of counties in England and Wales, and that there should be constituted for England and Wales separately a Review Committee consisting in each case of three persons, the greatest authorities on agriculture and estate management obtainable, who should be empowered to take legal advice if necessary.

Powers as regards Landowners.—The Sub-Committee recommend that if, in the course of survey, it appeared to the Board of Agriculture that land (other than a public or private garden or park) was, from any cause, not being fully utilised for the production of foodstuffs or timber, notice should be served upon the owner of the land by the Board of Agriculture to the effect that if, after an interval of three years from the date of notice, the position was still unsatisfactory, the case would be referred to assessors. If, at the end of these three years, evidence was not forthcoming of substantial improvement, the case should be referred to the panel of assessors for the area, who should select three of their members not resident in that county to examine and report upon it. They should be required to inspect the farm or estate personally and to hear everything that the owner, or agent, or tenant, or any witness whose evidence they thought material to the case, had to say. But no counsel or solicitor should be permitted to appear professionally before them, nor should any costs be allowed On receiving the report of the assessors the Board of Agriculture should refer it to the Review Committee, whose function it would be either to recommend the adoption of the report or to order a supplementary or, if necessary, a new report. The Committee should not re-hear the case or act in any way as a court of appeal, but merely consider and review the report. If the report, as passed by the Committee, was adverse to the general management of the estate, and showed that good farming was being discouraged or impeded, or bad farming treated with too much leniency, or that, for any other reason, the estate was not making the contribution which it could reasonably be expected to make to the production of foodstuffs, it is recommended that the Board of Agriculture should be empowered temporarily to supersede the landowner in the management of the estate, for all purposes essential to agriculture.

When once the management of an estate had been so taken over by the Board of Agriculture, it should retain that management for five years, unless within that period there had been a successor in title to the original owner, in which case the estate should be handed back to his management at the end of the current farming year, if he so desired it and was prepared to accept such liabilities as may have been incurred in connection with it. If there had been no change of ownership within that period, the Board of Agriculture should be empowered to hand back the estate to the original owner at its termination if it was satisfied that the future management of the estate would be satisfactory.

If it were not so satisfied, then it would continue to manage the estate for another quinquennial period, and so on from five years to five years, until there had been a change of ownership.

The owner should, throughout, be undisturbed in the exercise of sporting rights over the estate, subject to the power of the manager of the estate to prevent those sporting rights being exercised in a manner detrimental to agriculture or forestry. If the owner of such an estate is unable or unwilling to develop it for the purpose of agricultural production, the Board of Agriculture should have the power to borrow from the Land Commissioners and to develop it for that purpose by the expenditure of capital, the charges for which (interest and sinking fund) should have priority over all existing charges on the land charged according to the principle embodied in the Improvement of Land Act, 1864. During the period of supersession the power of the owner to make any fresh charges on the estate, or part of the estate, should be suspended, and the existing charges on it, whether by way of mortgage or of settlement, should be paid out of the proceeds of the land by the Board of Agriculture.

Powers as regards Tenants.—It should be laid down, say the Sub-Committee, that it shall be the duty of every landowner so to manage his estate, and that it shall be an implied condition in every lease or tenancy agreement, that the tenant of agricultural land shall cultivate the same according to the approved practice of the best agriculture, with a view to the economic production in the interests of the community of the greatest amount of foodstuffs (for man or beast) of which the land, having regard to its quality and position, is reasonably capable.

Where land is being badly farmed by a tenant who holds a lease, and who persists in farming badly after being duly warned of the ultimate consequences, the landowner may bring the case before the Board of Agriculture, at the same time giving formal notice of his action to the tenant. The Board should thereupon ask the local panel to appoint assessors, resident in another county than that in which the farm is situated, to report upon the farm, and in due course should refer their report to the Review Committee. If, as the result of the unfavourable nature of the report in respect of the farming of the land, the Review Committee so recommended, then the Board of Agriculture should be empowered to call upon the landowner to give twelve months' notice to the tenant to quit, and that notice should have effect as if the tenant had held no lease, but was a tenant holding on a yearly agreement.

Cottages.—The Sub-Committee strongly insist that there can be no hope of a satisfactory development of agriculture, as long as the demand for cottages remains unsatisfied, and that the provision of cottages should be taken in hand without a moment's avoidable delay after the War.

Sugar Beet.—The Sub-Committee attach great importance to the establishment of the sugar beet industry, and they urge the Government to arrange without further delay for a complete test of the commercial possibilities of manufacturing sugar from home-grown beet. They hope that the test will prove that a considerable proportion of the sugar we consume can be grown in the United Kingdom, and that the introduction of the beet crop into the rotation will increase the yield of the other crops. In short, the Sub-Committee believe that it will prove that the introduction of the sugar-beet industry will be a contribution of much importance to the increased production of foodstuffs in the United Kingdom.

REPORT ON HUMOGEN.*

E. J. RUSSELL, D.Sc.,

Director of the Rothamsted Experimental Station

HUMOGEN is the name given to a preparation of peat invented by Professor W. B. Bottomley, of King's College, London, for which high manurial value has been claimed. The substance is prepared by neutralising the peat and then causing it to undergo bacterial decomposition up to a certain point, after which the mass is sterilised and inoculated with a culture of nitrogen-fixing organisms.

Survey of Previous Experiments.—Experiments made at Kew with plants in pots gave extraordinary results, suggesting that humogen had some positive, definite action on plant growth. These experiments have been several times described, so that no further account is necessary. The humogen was used at the rate of 1 part to 7 or 8 parts of soil by volume, a quantity that is quite feasible in pot work, but out of the question for agriculture.† Pot experiments with these large amounts were also made at Wisley, and definite increases in growth were obtained which, while in no way sensational, showed that the material is of value to the horticulturist growing plants in pots where economic considerations do not come in. This result is quite intelligible; the addition of so large an amount of organic matter in so fine a condition as humogen could hardly fail to have a good effect on the soil in a pot, while the large amount of nitrogen thus introduced adds to the supply available to the plant.

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* See Editorial Note, pp. 12–13.

† No weighings seem to have been made, but, taking the ordinary specific gravity values, the dressing of humogen in these experiments probably amounted to some 30 to 50 tons per acre.

Other experiments, however, led Professor Bottomley to believe that such large quantities were not necessary and that much smaller amounts would give equally good results. In a paper read before the Royal Society in 1914 he claimed that an extract of this humogen had remarkable stimulating effects on the growth of plants, which he considered to be analogous to those obtained by Hopkins and others with the so-called accessory bodies; he therefore supposed that some of these were present, and he gave them the name "auximones." Further, he stated that the auximone could be isolated by precipitation with phospho-tungstic acid, and he obtained in this way a concentrated stimulant which was said to cause remarkable increases in plant growth.

The purpose of our investigations at Rothamsted was to ascertain whether humogen possesses the value for agriculture which the Kew experiments indicated for horticulture. Claims of the most extensive kind had been made; serious journals had printed statements to the effect that the use of humogen

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EDITORIAL NOTE.—A proof of the report of these experiments by Dr. Russell was sent to **Professor Bottomley,** who writes as follows:—"The results obtained last year by Dr. Russell are not surprising in view of the fact that late last autumn I discovered that the material sent to Dr. Russell, both from Entwistle and Manchester, was not *bacterial* peat but a *chemically treated* peat, which contained substances injurious to plant growth. Most unfortunately, there was a serious error in the manufacture of the early lots of humogen sent out from both places. Briefly, what happened was as follows:—At both places work was not commenced until late in March; the machinery available was most inadequate, and the wet peat, as cut from the bog, had to be used at once, without any preliminary aeration or drying.

"In the process of manufacture a small amount of sodium carbonate (½ to 1 per cent.) is mixed with the raw peat, sufficient to neutralise the acidity without producing a soluble humate, before incubating with the aerobic decomposition organisms. In the original manufacture of humogen at Greenford, the depth of colour of the water extract obtained after incubation with these organisms was used as a guide to the effectiveness of the bacterial decomposition of the peat, and incubation was allowed to continue until a dark coloured extract was obtained.

"As humogen was wanted as quickly as possible last spring for experimental work in order not to miss the season, it appears that those in charge of the works, well knowing the solvent action of alkalies on peat humus, added an excess of sodium carbonate to the raw peat—in some cases as much as 6 per cent.—in order to obtain quickly a soluble humus, and thus, as believed, obviate the necessity for a lengthy period of incubation. This was contrary to my definite instructions as to quantities and time for incubation. The result was that a chemically-treated peat, containing an excess of soda, was sent out instead of a properly bacterised peat.

"I had no suspicion that anything was wrong with the early lots sent out until I heard from Messrs. Sutton, of Reading, that their experiments with the material were showing that it contained something which actually checked plant growth, and as this was contrary to what they had anticipated, after might be expected to "double the food production of the country"; some went a little further and spoke of trebling it.

When, however, the basis of these various statements was examined it was found to be somewhat slender, and to consist mainly of testimonials which, as every agricultural investigator is aware, always seem to be forthcoming whenever a new fertiliser is brought before the public. The trials made at the regular agricultural institutions had in the main given negative results, and there was practically no evidence of agricultural value to which exception could not be taken.

The Woburn pot experiments[*] with several crops had given increases when the material was used at the rate of 18 or 36 tons per acre; but as the material is offered at £6 or £7 per ton the cost of such dressings would be prohibitive. Outdoor experiments with applications at the rate of 5 cwt. per acre gave only small results.

The Wisley experiments[†] made out of doors with turnips gave disappointing results which in no sense bore out the claim that humogen contained "50 times as much plant food as farmyard manure"; 1 ton of humogen gave smaller yields than 20 tons of farmyard manure.

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seeing the results obtained at Kew Gardens in previous years, they wanted to know the reason. For some time I could obtain no clue, for each time I visited the works everything appeared to be in accordance with my directions, and it was not until September that I was able to locate definitely the cause of the trouble.

"It was impossible, owing to my College duties in London, for me to be present at Entwistle and Manchester when the first lots were being manufactured, hence, I had to depend on other people for my instructions being carried out.

"Although the error was beyond my control, I deeply regret that the time and labour involved in the Rothamsted experiments should have been expended on testing a substance which was not humogen.

"That the material sent to Rothamsted was not properly prepared is evident from the negative results obtained by Miss Brenchley with water cultures. In every other case of water culture experiments with properly bacterised peat, including those carried out under the supervision of Professor V. H. Blackman at the Imperial College of Science, South Kensington, and which were seen by representatives of your Board, water extracts of bacterised peat have given remarkable results. These results will be published by the Royal Society, and a résumé of them will be given in a later issue of this *Journal*."

Dr. Russell states that the material was sent to him in May, 1916, as true humogen; it was not purchased unknown to the vendors; and Professor Bottomley, the Cleansing Department of the Manchester Corporation, and the Entwistle firm, all knew that it was for the purpose of these trials. Neither then, nor in any subsequent correspondence, nor on the occasion of Dr. Russell's visit to the works at the end of August was there any hint that the material was defective, and the first intimation to this effect was a letter from Professor Bottomley to Dr. Russell on 17th March, after proofs of the present report had been submitted to Professor Bottomley.

[*] *Jour. Roy. Agric Soc.*, 1915, 76.

[†] *Jour. Roy. Hort. Soc.*, 1916, 41, 305–326.

Experiments at the Midland Agricultural College also gave negative results.[*]

More positive results appear to have been obtained at Sparsholt,[†] but the published data are not sufficient to justify detailed discussion. Seven varieties of potatoes were grown; two, King Edward VII. and Golden Wonder, gave large increases in crop with humogen, while five gave smaller increases of about 20 to 30 per cent.

The basal dressing was 1 cwt. of sulphate of ammonia and 2 cwt. of superphosphate; the amount of humogen added is not stated; the trial was of "humogen basal dressing" against "basal dressing alone," and no comparison was set up between humogen and farmyard manure.

The results were:—

Variety.	Unsprayed.				Sprayed twice (early and late in July).				Sprayed twice and dressed with "Humogen."			
	tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.
British Queen* ..	4	19	2	11	9	0	3	6	12	12	1	8
King Edward VII. ..	3	16	1	10	4	16	1	20	9	1	2	12
Up-to-date	7	11	3	14	9	17	2	20	11	8	3	20
Arran's Hope	7	9	1	24	8	12	3	2	10	8	3	20
Arran's Chief	5	10	3	16	7	7	0	6	9	0	0	0
Golden Wonder ..	4	16	1	20	5	8	1	26	10	7	1	8
Langworthy	3	19	0	17	5	4	1	24	5	12	2	0

* The seed was all one-year from Scotland, except that of British Queen, which was direct from Scotland that season.

As the plots were not duplicated it is impossible to say what degree of significance the results possess.

Other experiments at Sparsholt made with tomatoes also led to increased yields; but in experiments with peas, broad beans, dwarf beans, carrots, beets, parsnips, celery, leeks, currants, gooseberries, raspberries, strawberries, apples, pears and plums, none of these "were affected in the least."

A series of tests with tomatoes and cucumbers made at the Lea Valley Experiment Station[‡] gave wholly negative results.

The Rothamsted Experiments.—The Rothamsted experiments were undertaken at the request of the Board of Agriculture in 1915. Professor Bottomley gave full information of sources of material, methods, etc., and arranged at a later date for a visit to the Works at Manchester and at Entwistle. Unfortunately the supply ot humogen was not available till the end of May, 1916, and the experimental test was therefore less extensive than had been intended. Of four major tests designed, three were carried out satisfactorily, but the fourth with mangolds at Rothamsted was so delayed that it is not desired to attach much significance to it. The results of all the experiments, however, are in agreement.

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[*] Rept., Midland Agric. and Dairy Coll., 1915, pp. 33–35.

[†] Report on Potato Expts., Sparsholt, Winchester, 1915.

[‡] First Ann. Rept., Expt. and Research Station, Turner's Hill, Cheshunt, 1915.

In order to eliminate local influences of soil, climate, etc., the experiment was carried out partly at Rothamsted, and partly at the Harper Adams Agricultural College under Principal P. H. Foulkes. The experiment was designed to show the effect of humogen by itself, and in conjunction with farmyard manure, and with farmyard manure and artificials; the last being intended to show whether humogen has any stimulating effect that will help the plant to make better use of the foods already supplied.

Two sorts of humogen were used; one coming from Manchester being prepared by the Cleansing Department from peat excavated on Chat Moss, and the other from Entwistle being prepared by the Entwistle Mountain Peat Estate Company, from the peat overlying deposits of limestone.

In all cases the results were negative; the humogen had no effect.

The usual dressing was 10 cwt. per acre, this quantity being suggested by Professor Bottomley as being likely to bring out the value of the humogen.

Harper Adams Agricultural College.—The results with wheat at the Harper Adams College were:—

	Yield per acre.		*Total value of Grain and Straw.*		
	Grain.	*Straw.*	£	s.	d.
Humogen, 5 cwt.	46½ bush.	38½ cwt.	26	14	0
No dressing	47¾ ,,	45¼ ,,	28	6	3

If the humogen had any effect at all it was slightly to depress the crop.

Mangolds.—The results with mangolds were:—

Results in combination with Dung and Artificials.

	With Nitrate.			*Without Nitrate.*		
	tons.	cwt.	qr.	tons.	cwt.	qr.
*Humogen, 5 cwt. per acre	24	15	3	25	18	0
* ,, 10 ,, ,,	27	13	1	28	13	0
† ,, 10 ,, ,,	25	7	0	29	5	0
No humogen	28	0	0	28	1	1

* Entwistle. † Manchester.

Results with Artificials only. No Dung.

	With Nitrogen.			*Without Nitrogen.*		
	tons.	cwt.	qr.	tons.	cwt.	qr.
*Humogen, 5 cwt. per acre	22	0	3		—	
* ,, 10 ,, ,,	23	2	3	20	2	0
† ,, 10 ,, ,,	26	11	0	25	18	1
No humogen	22	5	2	23	3	0
Ordinary peat, 5 cwt. per acre	27	5	3		—	
,, 10 ,, ,,	28	18	2		—	

Results without Dung or Artificials.

	tons.	cwt.	qr.
*Humogen, 5 cwt. per acre	19	18	1
* ,, 10 ,, ,,	19	15	2
† ,, 10 ,, ,,	18	10	3
No humogen	17	16	2
Ordinary peat, 5 cwt. per acre	19	5	3

* Entwistle. † Manchester.

In one or two cases where there has been no dung the humogen has somewhat increased the crop, notably when 10 cwt. of Manchester humogen were applied with artificials and nitrate; 10 cwt. of untreated peat, however, gave a still larger increase. The untreated peat was from Westmorland and not from Entwistle, but the result does not suggest that bacterisation has effected any very radical change. There seems no reason to assume any very special fertilising action beyond the well-known power possessed by finely divided peat of holding moisture.

Assuming the difference to be real, the 10 cwt. of untreated peat have given an additional 6½ tons of mangolds, while the 10 cwt. of Manchester bacterised peat have given 4½ tons. On the other hand, the Entwistle bacterised peat has given only 17 cwt. additional crop, a quantity to which no significance can be attached as it lies within the error of experiment. If the result means anything, it is that there is no more difference between the two samples of humogen than between humogen and untreated peat.

Garden Crops.—A further series of experiments was made on a smaller scale with garden crops. Only in the case of peas and potatoes was any increase obtained as a result of using humogen; the other crops, beans and cauliflowers, were actually depressed. Taking the results as a whole and allowing for the rather large error inseparable from garden crops, one may conclude that they show no increase as the result of applying humogen.

	Peas. lb.	*Beans.* lb.	*Cauli-flower.* lb.	*Potatoes.* lb.	*Total.* lb.
Humogen, 1 ton per acre ..	29½	21½	20	24	95
,, 2 tons ,, ..	33	19	26	18	96
,, 1 ton ,, and complete artificials	36	17½	19	14	86½
Ordinary peat	28	28	26½	20	102½
No dressing	27	24	33	15	99

Rothamsted Experimental Station.—*Mangolds.* — Owing to the circumstance that the humogen was not delivered till the end of May, the Rothamsted experiments with mangolds are not so satisfactory as those at the Harper Adams College. The lateness of sowing caused the plants to be badly affected by drought; plants on the humogen plots suffered at least as much as the rest. The results of the experiment are :—

	Plot.	*No. of Plants in Plot.* ($\frac{1}{10}$ acre.)	*Yield per acre.* Tons.
No manure	6	651	4·0
Manchester humogen only .	1	518	2·8
Entwistle humogen only . ..	11	603	3·5
Artificials only	7	899	5·4
Manchester humogen + artificials ..	2	793	4·9
Entwistle humogen + artificials ..	12	813	6·5
Dung and artificials only	10	926	9·6
Manchester humogen + dung and artificials	5	766	8·5
Entwistle humogen + dung and artificials	15	1,200	13·4

None of these crops is good, the drought having depressed them all considerably.

In one place the humogen appears to have had a good effect, but there is evidence that this is not real. Adjoining Plots 10 and 15 were two others (Plots 17 and 16) receiving complete manure, but no humogen; though treated exactly alike their yields were 11·2 and 16·5 tons, respectively, *i.e.*, the two plots were under identical treatment, and yet gave exactly the same differences as the two plots, one of which received humogen while the other did not. It is therefore not permissible to attribute the difference in yield to the humogen, but rather to a local difference between Plots 10 and 17 on the one hand, and Plots 15 and 16 on the other. Such local differences come out very strongly in periods of drought, and for that reason late experiments rarely give satisfactory results.

Thus the field experiments are uniformly negative. They show no special fertilising effect, and in the only cases where increases were produced they were no better than were obtained from untreated peat.

Mustard in Pots.—The pot experiments at Rothamsted were carried out under much more favourable conditions than the field experiments described above; only a small amount of humogen was wanted, and this was obtained in time. The general plan was to apply the humogen at the rate of 10 cwt. per acre, and to give it also in conjunction with a basal dressing containing potash and phosphates. Half of the controls received nitrate of soda containing nitrogen equal to that in the humogen. The crop sown was mustard, and growth was satisfactory throughout.

Again, however, the results were entirely negative and the humogen was without effect; untreated peat had at least as good an action. The figures are as follows:—

_Dry Matter Formed per Pot. Average of 6 Pots._*
Mustard.

——	Series.	No Basal Dressing.	With Basal Dressing = 10 gm. Superphosphate and 5 gm. Sulphate of Potash per Pot.	
		gm.	gm.	
No humogen	1	12·86	15·91	——
Entwistle humogen ..	2	13·015	16·86	5 gm. humogen per pot.
Manchester humogen..	3	13·00	17·59	5 ,, ,, ,,
Hambledon peat ..	4	13·34	17·20	5 ,, ,, ,,
Cheshire peat.. ..	5	12·47	17·04	5 ,, ,, ,,
Sodium nitrate ..	6	—	16·36	·08 gm. per pot: equiv. N. to that in 5 gm. Entwistle peat.
Fish guano	7	—	16·50	·31 gm. per pot.

* The humogen was added at the rate of 10 cwt. per acre, or 0·05 per cent. of the weight of soil in the pots. As an equivalent dressing in series 6 nitrate of soda was added at the rate of 0·16 cwt., *i.e.*, 18 lb. per acre or 0·008 per cent. by weight of the soil in the pots. The weight of soil per pot was 10 kilog. and the basal dressing was 10 gm. superphosphate + 5 gm. sulphate of potash, these being found by experience to be suitable. The fish guano contained nitrogen equivalent to that in the Entwistle peat.

Barley in Water-Culture.—The last series of experiments was carried out by Dr. Winifred Brenchley. Professor Bottomley had obtained a 50 per cent. increase in growth of wheat in water-culture by adding some of the extract of bacterised peat. Dr. Brenchley's experiments were made with barley because this plant has certain advantages over wheat for water-cultures; the results are given on p. 19.

The plants receiving humogen were rather darker in colour than the others, but the difference in weight is less than 5 per cent., and no significance can be attached to this result.

Peas gave equally negative results.

This is in direct disagreement with Professor Bottomley's result, but it is not difficult to account for the discrepancy.

Professor Bottomley's curve looks very convincing, but the figures are less satisfactory. The average weight of his individual plants was about 0·2 gm. *fresh weight*, while that of Dr. Brenchley's plant was 11·4 gm. *dry matter*. It is quite evident that there was something wrong with his cultures, for neither the untreated plants nor those treated with humogen made normal growth; indeed, his control plants actually lost weight. The light and atmospheric conditions at King's College are probably not very good, and are certainly not so good as at Rothamsted, so that, even assuming equal skill and attention, the plants would hardly have done as well as in our laboratories. In view of the very abnormal growth at King's College the writer does not consider that there is any evidence of stimulation of growth.

Water-Cultures. Average 10 *Plants. Barley.*

Entwistle Humogen.	Weight of Dry Matter per Plant.		
	Shoot.	Root.	Total.
	gm.	gm.	gm.
No humogen (control)	9·35	1·76	11·1
Extract of ·2 gm. of humogen per plant	9·75	1·74	11·49
" ·6 " " "	10·08	1·57	11·65

Summary.—Summing up the results, we find no evidence that humogen possesses any special agricultural value. There is not the least indication that it is "50 times as effective as farmyard manure," to quote an often repeated statement, and there is nothing to show that it is any better than any other organic manure with the same content of nitrogen. It is offered at present at £5 per ton in 2-ton lots; our experiments give no reason for supposing that it is worth anything like so much.

This result is in entire disagreement with the claims made on behalf of humogen, and the question naturally arises: Are those claims wholly without foundation?

In endeavouring to arrive at a solution of this question two circumstances must be taken into consideration: (1) the fact that good results were undoubtedly obtained in pot experiments both at Kew and at Wisley; and (2) the evident variability in the composition of humogen.

(1) The writer is quite prepared to believe that the horticulturists found humogen in the quantities used at Kew and at

Wisley a valuable addition to the compost used for potting up plants, but he is not prepared to say that humogen is any better than an equal amount of untreated peat in an equally fine state of division. Such finely-divided organic matter will serve several useful purposes in pots, and when it forms 12 per cent. or more of the whole bulk it is present in sufficient amount to exert a useful effect.

It is quite possible that heavy dressings would have good effects on poor soils deficient in organic matter, but they would have to be on a far larger scale than is possible at present prices.

(2) The second point to which attention should be directed is the evident variability of the samples. The analysis published in "The Spirit of the Soil," by G. D. Knox (p. 86), for which Professor Bottomley accepts responsibility, claims :—

Percentage of total nitrogen in humogen .. .. 4·310 per cent.

Rothamsted analyses on the other hand show :—

	As sent out.		*In dry matter.*
Percentage of total nitrogen in Manchester humogen	0·570	..	1·29
Percentage of total nitrogen in Entwistle humogen	0·431	..	1·32

Here, of course is an enormous discrepancy. The book seems to indicate that the 4·3 per cent. of nitrogen is contained in humogen as sent out, but even if this is presumed to be an error, and the figure is taken to represent the amount in the dry matter, it is still greatly in excess of anything that we find. It must be supposed either that there has been an error in Professor Bottomley's analyses or that the two samples of humogen sent to Rothamsted were considerably poorer than the earlier samples.

Dr. Voelcker has also called attention to the variations in samples sent out, one examined by him containing 0·48 per cent. of soluble nitrogen, while another contained 0·08 per cent. only.

This variability is, of course, highly unfortunate. It is possible that some samples have acted well in the field ; it is certain that others have not. There is no definite evidence that "bacterisation" really adds to the value of peat. In the writer's view the wisest plan would be to concentrate on experimental work and stop all propagandist operations until some definite basis of incontrovertible fact has been attained. The latter point is still a long way off ; the problem of utilising peat is sufficiently difficult to occupy the whole attention of a laboratory for some years, and nothing but quiet, serious work is likely to solve it.

THE EDUCATION OF CITY BOYS ON THE LAND:

A Preliminary Inquiry.

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THE separation of interests in English domestic government between counties (chiefly agricultural) and cities (largely industrial) has led to an unfortunate situation in the educational programme: for in using farms and gardens as apparatus for education the county thinks almost wholly of educating its own people—the sons of farmers and other country folk. Such persons are materially helped by the sciences which are placed at their disposal, and it is not for a moment intended to depreciate the importance of the Agricultural College, the Ruralised Secondary School, or the Winter Continuation Classes, all of which tend to increase the economic value of the county's output, to increase the happiness of the countryman's life by enlarging his interests, and hence to keep more people *on* the land.

But were an agricultural county council asked to enlarge its scope and offer special facilities for education to the youth of cities, it would decline, the rates being already burdensome, and the county spending its money on what it believes to be the interests of its own agricultural people. The city acts in a similar manner, with rare exceptions spending its money within the city, intensifying the exclusive tastes and interests fostered by city life. Just as cotton-spinning and engineering are trades which the town of Bolton must foster and aid by its methods of schooling, so farming and kindred industries are the trades of Gloucestershire, and are the chief concern of the people of that county. This estrangement has been inevitable, but when the situation is fully thought out, it will be seen to be disastrous, since agriculture, while in one sense a trade, is from the national point of view a *mode of life*. (The widest definition is given to the term "agriculture," to include all employments *on the land*—all such as take a man chiefly into the open air). This national point of view concerns not only economics but physical and moral well-being. Agriculture is a trade, but far more than a trade: it is a fundamental asset to a wholesome national life that a goodly proportion of cheerful industrious people should be out at work living and multiplying on the countryside. All that has happened since

August, 1914, only tends to confirm this view, and it need not be enlarged upon. One piece of evidence arising out of the Derby recruiting effort may, however, be noted: the writer's own inquiries as a "canvasser" in a congested area in Manchester have appalled him, by revealing so large a proportion of men, married and single, returned as medically unfit to take up army life.

1. The inquiry discussed in this paper, therefore, starts with the axiom that the *primary function of agriculture is to produce men*: turnips and cattle are important enough, but they are only means to an end. If a sufficient supply of competent men is bred in the country, we shall not only, as now, furnish the cities with a large proportion who will "drift" thither and be used up in factories and warehouses, but we shall have enough remaining on the countryside to grow an increasing supply of agricultural produce and to keep alive a fine race of men and women. This use of land, as a nurture ground for human life, has always been acknowledged and enjoyed by those who have the means. The impulse which moves the city merchant to buy a "pleasure farm" is not the mere ostentatious display of wealth, but a sound instinct of self-preservation for his family and his class. Such men, it is true, do not wholly forsake the city, but thanks to the rapidity of modern means of communication, they can reap the benefit of both modes of life. The less fortunate classes are not so happily situated, and the conditions of national health and well-being are now so clearly displayed as to warrant the direction of public attention to this aspect of what is called "the land question."

It is clear that if agriculture is regarded from this standpoint all proposals for reform alter their aspect. The ordinary treatment of topics such as reform of land tenure, of housing or of wages, is based on the assumption that living in the country in England can be conducted with the same prospects as in Canada or New Zealand. Such reforms are not here considered. however important they may be, they are only of consequence as subsidiary to the main purpose of facilitating the maintenance of more families on the countryside.

2. The present inquiry is based on a belief that certain factors in human nature have hitherto been left out of account, and it is desirable in the national interest that these factors should be considered. Briefly stated these factors are as follows: (1) "Individuals differ widely in temperament and disposition: and some find country life so congenial that they

will endure many sacrifices in order to attain it. (2) Many people of the type indicated are born in cities and often have no chance of discovering that the country is their proper home. (3) The disposition referred to in (1) is often accompanied by slight physical disability, such as nervous or throat trouble or general lack of robust development. Persons of this type are commonly of average or superior mentality, and possess a capacity for organisation superior to that of folk bred in the country. This point is important, since the lack of co-operation is notoriously one of the chief hindrances to the prosperity of country folk. (4) A change of life such as migration from town to country must be begun in youth. The attempts made by reformers like the late Joseph Fels to transplant families have been very hazardous. A countryman not only follows a different trade from the townsman, but his domestic and social habits are different, and the latter cannot easily be uprooted; if in any given family the husband adapts himself to the new position the wife perhaps cannot, or *vice versa.*

With these factors coming into play one ought to find a stream of migration from the city to the country, acting as an offset to the depopulation of the countryside. Is there any evidence that this is the case? The well-to-do are in the fortunate position of being able to make the best of both town and country. At the other end of the social scale there is no such power: when children of the labouring class once reach the city they cannot return even if they wish to do so. Between the labouring and upper classes, however, there is evidence, not statistical but quite adequate, to show that a considerable number of people every year abandon city employment to take up poultry-farming or market-gardening or allied occupations. Thousands more accept the aid of emigration societies and seek in our Dominions or the United States the kind of life which they would prefer to follow in England.

It may be concluded, therefore, that while the actual force of this stream to the English countryside is minute in comparison with the contrary stream from village to city, its *potential* force is great enough. This is important, as organisation is useless if it attempts to work contrary to natural tendencies.

3. I have therefore made some inquiries to discover what efforts are made to educate city boys over 12 years of age to fit them for rural occupations, *i.e.*, not merely to give them lessons in a school situated in the country, but to provide them

with first-hand experience of country occupations. Practical and useful employment under competent guidance often affords a better schooling than the modes of learning commonly associated with the teacher's desk. In any event, there is no danger of the three R's and the use of books being neglected at the present day, and the boys under consideration will have previously acquired the elements of primary education.

There are at present three groups of institutions which provide agricultural instruction. (*a*) The first group comprises the agricultural colleges, which are not considered here. (*b*) The second includes institutions corresponding as regards the age of the pupils to ordinary secondary schools. An examination of the Memoranda issued by the Board of Education shows that in most counties provision is now made for the instruction of farmers' sons, *i.e.*, boys who have already acquired farming skill and look to the school for instruction in agricultural science. This is clearly not the sort of education needed by a lad fresh from the city, unskilled in country arts and with little prospect of employment afterwards beyond the rank of a labourer. So far as the writer is aware only two institutions definitely aim at taking charge of city boys: the Scouts' Farm which Sir Robert Baden Powell has established at Wadhurst in Kent, and The Endowed School at Staunton-on-Wye, Hereford. The latter receives both boys and girls as boarders at low fees, and, in addition to school lessons, offers them work on a small holding, with dairy, poultry and gardens. The former merits special attention, because the boys are educated on novel lines; they work in gangs or patrols on a farm of 200 acres; and their discipline is not regulated by schoolmasters, but by the spirit of public service expressed in the Scout movement. Hitherto, most of the city-bred boys turned into farmers at Wadhurst have gone to the Colonies, and it was evidently the idea of the founder that English farm life would not supply a career for city boys lacking capital.

(*c*) The third group is the only one which conducts its operations on a large scale and is concerned with the lowest grade in English society, that is institutions for waifs and strays* maintained wholly by philanthropy, and the reformatory and industrial schools, maintained partly by subscriptions, but chiefly by the grants of Local Authorities and of the Home Office.

These institutions bring a certain proportion of their inmates

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* I am under great obligation to Mr. C. E. B. Russell, His Majesty's Chief Inspector of these Schools, not only for advice but for enabling me to visit a few of th

"back to the land" in two ways; (1) Boys who are educated wholly in the cities are sent to farmers under licence, very often to South Wales or to Ireland, and are thus kept at farm work until at least 18 years of age; (2) Some of these institutions are farm schools, *i.e.*, a farm is a part of the equipment and is maintained side by side with other industries, such as tailoring, shoe-making, carpentry or engineering. Thus the Lancashire Branch of the National Children's Home and Orphanage at Edgeworth is practically a model country village in which boys and girls engage in all the domestic, industrial and agricultural crafts which their common life demands. The Desford Farm School, a certified industrial school belonging to the Leicester Education Committee, specialises in farming and gardening, as well as in the staple trades of Leicester. The Little Commonwealth, conducted now for some four years near Evershot in Dorsetshire, is the most revolutionary venture in this field of social effort, and in its departure from conventional principles may be classed with the Scouts' Farm, which deals with boys from "good" homes, while the former receives children who have started on a criminal career and are in sore need of rescue.

The Little Commonwealth was so frequently reported upon in the press a year or two ago that it is unnecessary to describe its methods here. For the present purpose it should be observed that the farm is an important part of the equipment, and that some of the boys choose the farm or garden rather than more remunerative work in cottage building, on which they can be employed if they prefer.

There are at the very least 150,000 boys in industrial schools, reformatories, orphanages and other philanthropic institutions, who come from the congested areas of our cities. Many thousands of these are still housed in the cities, but their patrons are gradually realising more clearly the great benefits of open-air activity. It is not enough, however, to educate these young folk on the land; a considerable proportion of them ought to stay there: not all, because one must admit that some are by temperament unsuited for country pursuits. The deplorable fact is that after a few years only a very small number remain on English land. Just as in the case of the Scouts' Farm, they are sent to Canada or Australia; the superintendents again and again tell me that there is no room for them on English soil, *i.e.*, they can hope to secure at the best so scanty a livelihood that it is hopeless to encourage their natural bent towards a country life.

4. So much for a diagnosis of the situation. The remedies for this unsatisfactory state of things must clearly be sought in the field of social organisation, *i.e.*, the study of human nature as exhibited in country life, and regard for influences to which human nature (see par. 2 above) will respond. Research in agriculture, which has hitherto been mainly concerned with scientific problems of breeding and fertility, is not in itself sufficient to provide a solution, and a point has now been reached when sociological science must be called in to its assistance. To take an example: at present agricultural progress is hindered by the lack of workmen able to adapt themselves to the new conditions of farming, and it would provide a fascinating sociological study to determine the conditions under which the necessary type could be produced in sufficient numbers.

As regards measures for general improvement it should be possible to indicate directions in which the State, either the local or central authority, can help, but on the whole the problem is at present one mainly for private initiative.

5. It will be convenient to distinguish in our survey of proposals the different ages of the young people under consideration: (1) the children under 14; (2) youths from 14 to 18; and (3) the most difficult field of all, young men over 18 years of age.

(1) *Children under 14 Years of Age.*—It has already been pointed out that many thousands of children are cared for either at the public cost or by philanthropic institutions. Every one of these should be in the fresh air, and they would be the better, morally and physically, if they worked and played on the land. Here is surely a field where State action could operate with general approval. Huge industrial boarding schools and refuges which might well be transferred to rural districts are still maintained in the congested areas of large cities [The Edgeworth Cottage Homes referred to above present a model of what might be done.] These institutions enjoy large grants-in-aid and the State might properly make its support dependent upon this salutary change being effected. Even the day industrial schools could be removed to the outskirts of their cities, for the tramcars would carry the children out and in at the very times of day when the cars are making almost empty journeys.

Nor should the programme of the public elementary school escape notice. The most progressive schools are already doing a little gardening, and more could be done if advantage were taken of the vacant plots of land which are seen in every city. These will not be built upon for a long time now, until national prosperity returns: why not let the elder scholars grow vegetables, keep poultry, and make such untidy places fair and sweet? It should be emphasised that all such suggestions are *directly in the interest of agriculture.* Every English boy or girl who grows up with a practical knowledge of what it means to keep live stock, and to grow cabbages and potatoes, is a potential friend of the farmer. At present many country folk regard city folk as enemies, or merely as purchasers of milk and meat, while city folk regard the country farm merely as a place to look at over a hedge. It would be to the national benefit to pay an extra grant to every city school which would produce a thousand eggs or a cwt. of sound potatoes per annum, just for experience of values gained by the children.*

(2) *Youths from 14 to 18 Years of Age.*—For fear of misunderstanding let it be said that consideration of the case of girls is omitted, not because they are unimportant but because, while girls need practical activities and fresh air as much as boys, additional considerations would be introduced if one tried to treat both sexes in one survey. It has already been pointed out that the first claim on the land comes from those who display physical or moral disability and who, if left in the city, will make a failure of life. The period of youth or early adolescence is, in many instances, a time of tragedy from this point of view. Every case "committed" by a Juvenile Court, where it is clear that the home cannot exercise control, ought instantly to be transplanted to the country with as much promptitude as a case of consumption or scarlet fever is dealt with. This suggestion is made quite regardless as to whether many of the cases will return to the city after 18. It would pay the State many times over to offer a premium for every such boy who is enabled to live successfully an open-air camp life from 14 to 18. The rule should be the same for boys in all ranks of society. The Scouts' Farm at Wadhurst and, possibly, the Endowed School at Staunton-on-Wye are worthy of more careful investigation than it has been possible to give to them. The Scouts' Farm is especially significant in its sociological aspect. The boys are organised as a community, working in gangs of six or eight, called patrols; one patrol works in the dairy for a month, then for a month in the fields, or in the workshop, or in the house doing domestic

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* *Cf.* "School Gardens and Cookery Classes": *Times Educational Supplement*, 5th October, 1915.

service. This arrangement provides a social experience which life in the country usually fails to afford, and it is probable that some such form of communal activity is essential to sound development in the period of adolescence. It is, moreover, especially helpful to the prospective farmer, for it accustoms the lad to co-operation. One reason why lads of 18 flock to the towns is that the country is too " lonely," and they know that they can get companionship in the towns ; but if a boy is introduced to farm life with an appropriate social organisation he will more readily find his own way out when he gets older : he will become a leader in co-operation among his neighbours ; he will decline to remain in the old rut of isolation.

Neither man nor boy can learn co-operation except by practising it, and when every lad on a farm is helping his fellows he is not only learning farming, but is acquiring the social arts which are the basis of modern success in business The same feature is witnessed, with a different type of human material, in the Little Commonwealth. In this case the youths have been transplanted straight from a society where they were both repressed and stimulated to lawlessness, to a community where all their social instincts find expression in normal rational activity. Both at Wadhurst and Evershot a regime of hard work is humanised by fellowship ; and most adolescents require such fellowship. The life of such lads may be contrasted with the fate of many reformatory cases which used to be sent in large numbers to farms in Wales, where the very speech of the farmer's family was an unknown tongue !

It is suggested that the time has now arrived for extended sociological experiments by private initiative and philanthropy. No doubt care would be required in the selection of men to conduct such work—men like Baden Powell and Homer Lane are not to be picked up casually—but there are plenty of men helping in the Scout movement and other social work, who love country pursuits and have a grasp of the social principles involved in the guidance of youth.

Probably we are not ripe for State support in this field, although there seems to be no reason why a farm such as that directed by Sir Robert Baden Powell should not be treated as an efficient secondary school, entitled to earn grants from a local authority or from the Board of Education, as much as an institution which instructs in Latin and mathematics. It is doubtful whether experiment on the sociological side would have free enough scope if a public authority undertook to supervise the programme, but one can fairly hope that the experiments at Wadhurst and Evershot will stimulate others to make similar experiments, in order to establish beyond doubt the intimate relation between agriculture and sociology.

(3) *Youths over 18 Years of Age.*—In all the institutions the writer has visited, he has inquired as to the extent to which boys over 18 years of age remain on the farm or seek other occupations. Considering the depressing outlook as regards wages and prospects of promotion, the replies received have not been discouraging, but it is not pretended that they have covered a large field of inquiry. In the industrial and reformatory schools, when a farm is carried on side by side with other employments, the boys see readily how much better off in pocket they will be if they select the factory and the workshop in preference to the garden or the farm. This is especially noticeable at Desford, where the governor gives every encouragement to the lads to choose the latter occupations, but he can scarcely contend against the highly-paid offers of the Leicester boot factories. The influence of the home (which did nothing, or worse than nothing, for the lad when he was little) is often exerted to get him back to the city. Many of these boys *want* to remain on the land; they especially like being among horses and cattle (they often, indeed, prove useful as grooms and coachmen), but circumstances prove too strong, and a lad who might be a capital asset to the agricultural interest goes back to the city; all the better, it is true, for his sojourn on the farm, but losing the best chances for development in the national interest. The competition within these industrial schools and reformatories does not seem to me therefore to be quite fair. If city boys are to be turned into farmers they should belong to a community where everyone is on the job, as at Wadhurst, and, in a less degree, at Edgeworth. This would give them more pride in their calling and more readiness to pick up the scientific side of it; youth is very susceptible to leadership and the hope of achieving a fine result. Both at Desford and at Wadhurst the farm buildings are good, and there is an air of efficiency, which is needed if active and intelligent boys are to conceive a life-long attachment to their employment. If, however, during these years of training, they mix with boys who are pursuing a rival trade with better prospects, their enthusiasm may be damped. Hence, it is desirable that some schools of this type should be confined to farming and cottage building, following the example of Wadhurst. Every inmate would then feel something of

the enthusiasm needed to revive rural England, determined, in spite of obstacles, to forge ahead in village life and make a place and home for himself. Your true countryman will not live in the city on any account, and this *esprit de corps* can be created in a farm school as readily as in a public school, as soon as men who understand boy nature are forthcoming.

6. The resources of social organisation, however, are not exhausted when the city boy, alert and eager, has got his feet well planted on the foot of the agricultural ladder. We live in a time when "after-care," employment exchanges and other forms of machinery are devised in order to help young folk to find a hopeful career. Machinery of the employment-exchange type is well adapted to meet the needs of some industries, and, in times of crisis, to supply temporary assistance to farmers; but before it can be of much use in supplying permanent labour the prospects must be very much improved and must be sufficiently promising to induce an increasing number of young people to settle down in the country and marry.

They are, perhaps, capable of getting more out of the land, and therefore of putting more money into their pockets, than ordinary agricultural labourers, who have often neither the ambition nor the organising social power which the former possess.* On the other hand, they have not the capital to make a start, and without spending a few years in gaining experience they would be incompetent to make a start even if the money were forthcoming. To bid them go into the open market without any hope of advancement is futile: so long as agricultural employment is so ill-organised as to turn adrift two men out of three who take it up in boyhood, no one can expect these lads to enter it with hope of success.

Can any resources be found to enable the agricultural interest to utilise this human material and keep it on the land? Those immediately concerned in this aspect of the problem are (*a*) the large farmers and scientific landowners who want labour of first-class quality and can pay well for it; (*b*) the governors and patrons of the institutions where these lads are trained; and (*c*) the enthusiastic supporters of the Agricultural Organisation Society, whose special mission it is to promote co-operation and initiative in small holders and, the like. All these classes of persons are concerned in devising such organisation as shall encourage and advance the position of every lad of promise: other lads may cheerfully be allowed to return to the cities! If the influential men who are promoting agricultural co-operation in various ways agree that this problem is important, and would confer with those who support the institutions here brought under review, some solution would be found. The matter is a difficult one, but it is clear that the hindrances which prevent young men from remaining on the land are not chiefly a question of wages, in which matter the country can never beat the city. What the young man wants is (1) society, *i.e.*, the comradeship of men (and after 18 or 20 of women also) engaged in the same line of life as himself, and sharing his hopes of making a good thing out of country life; and (2) prospects, *i.e.*, a fair expectation of being able after a few years to settle down and marry.

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* The country-bred boy, however, has knack and endurance. In such qualities no one can pretend to equal the youngster on the farm, who helps father and mother as soon as he can toddle about.

Since under present conditions neither congenial society nor reasonable prospects are available, new organisation is necessary to pioneer a new method. The writer can conceive the establishment (say in connection with the National Children's Home or with the Scouts' movement) of a centre in some agricultural area where co-operation is being preached: a place where a few young men can live during the critical years from 18 to 25, working on the land at reasonable wages, but coming in contact with the agricultural revival. An experiment which combines experience in social reform with experience in agricultural reform would be worth trying, for it would respond both to the intellectual and to the social needs of young men who have been bred in institutions and have thus learned the value of social action.

If it be not regarded as too fantastic the writer would carry the reader's mind back to those far-off days of the Middle Ages when monastic communities, Cistercians, Benedictines and the like, were the agricultural colleges of Great Britain. combining a social life adapted to the times with an enthusiasm for country pursuits and for agricultural skill. If enthusiasm for progress is to be revived, it must be admitted that the isolation so characteristic of farm life is a drawback which needs to be met by practical experiment in social organisation. History, here or elsewhere, should repeat itself, not in detail, but in the wide scope of human need. When Fountains Abbey, Tintern Abbey and the rest declined from their noble purposes and were left to ruin, they deprived the land of resources for agriculture and for society which have never been replaced.

These pioneers and investigators broke up the soil of our country in the higher interests of mankind, and their example invites us with our more enlightened knowledge and with our wider sympathies to renew the struggle on behalf of a New England, forced by a titanic war to re-shape its ways. Once again we may witness men of the city and men of the farm, men of learning and men of labour, uniting on behalf of English youth, using the native soil as an instrument of our high destiny, as a weapon not merely of commercial prosperity, but of moral and social betterment. If this land of England falls on evil days and suffers, it will not be for lack of bread but for lack of vision, for "without vision the people perisheth."

NOTE.—There is another field for inquiry affecting the fortunes of city children, which I have omitted because it needs separate treatment, viz.: the possibility of giving boys (and girls, too?), the chance of learning gardening before they leave school. Thus a supply of town artisans would be secured, ready to work allotments in their spare time and so increase greatly the food resources of England. This is a most important problem, and great good could be effected if City Education Authorities realised what is possible during the last two years of school life. But this topic needs detailed discussion beyond the limits of this article.

REPORT ON FURTHER INVESTIGATIONS ON THE CAPSIDS WHICH ATTACK APPLES.

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AND

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A PRELIMINARY account of the injuries caused to apples by plant bugs of the family *Capsidæ* appeared in the issue of this *Journal* for January, 1916. During the following summer conditions generally were not favourable to research, but a number of additional observations were made, and it may, therefore, be of interest to record the progress of the investigation up to the present date.

The work for the year was first planned to include both a detailed study of the life histories and habits of the bugs, and also preliminary trials of those insecticides which seemed most likely to prove effective, but it was found impossible to carry out the whole of this programme. The first section, therefore, was confined to field observation and to certain minor experiments on the various species suspected of causing damage.

The trials of insecticides were devoted primarily to testing the value of nicotine which had previously given the best results in this country, and which is evidently regarded in America as practically the only specific of real use against Capsids.[*] Unfortunately, bad weather during the vital period preceding the bursting of the blossom greatly hampered all spraying, and, subsequently, shortage of labour made it necessary to omit some of the experiments which were to have been carried out after the fruit had set. Difficulties of this nature, however, must not be regarded as altogether a disadvantage; they are inseparable from commercial fruit culture, and it would be of little use if treatments were devised which could only give success in favourable years.

The opportunities for carrying out the experiments were provided by Mr. Collins Clayton and Mr. F. Glenny, of Wisbech, while Mr. Travell, of Alcester, has furnished notes on spraying, carried out by him at Dunnington. The authors wish to express their gratitude to these gentlemen for the great assistance they have given.

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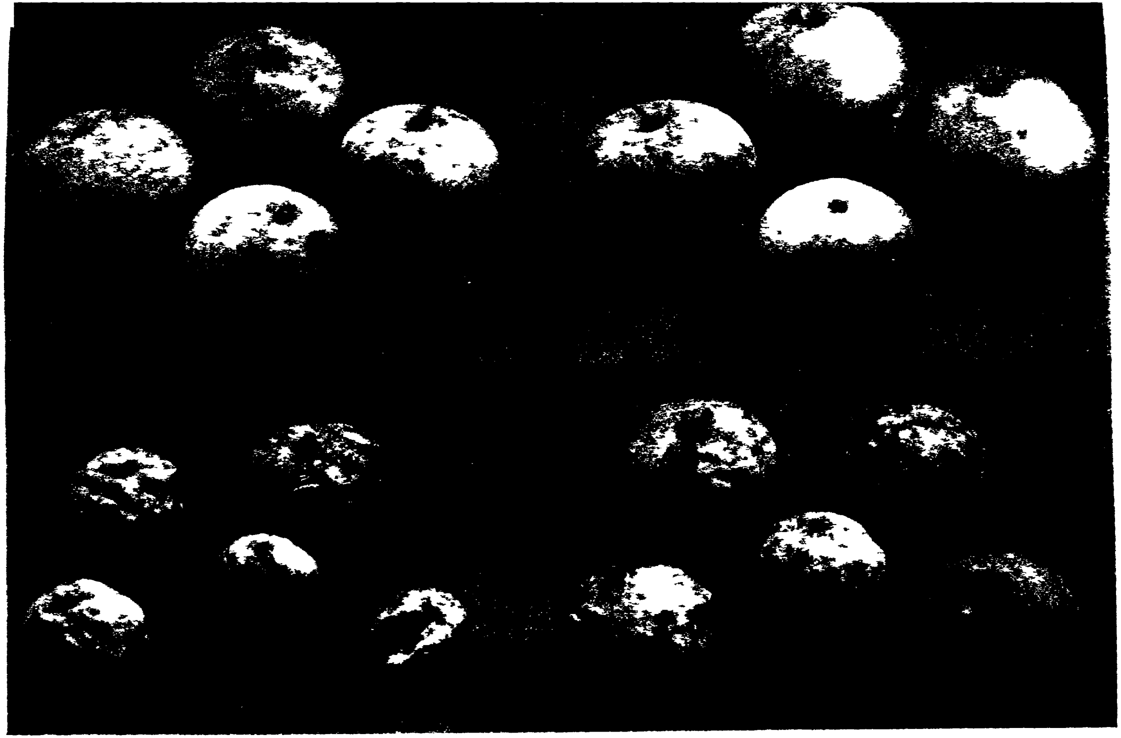
[*] The American Capsids are not the same as those which attack apples England, and, although they are both killed by a nicotine spray, it must not be thought that statements as to Capsids in American publications will necessarily apply to Capsids occurring in England.

General Notes.—Since only a short time elapses between the first appearance of the bugs and the opening of the blossom, it is important from the spraying point of view to know as accurately as possible when the majority of the bugs are hatched. In previous years the earliest date on which they were out in considerable numbers was 14th April (in 1913). A visit to the Wisbech district was therefore made on 10th April, but no bugs were seen. A further inspection was made on 17th April, but again no hatchings had taken place. On the 25th a few newly-hatched bugs and the first signs of damage were noted, and by 1st May the insects were plentiful. Newly-hatched bugs, however, could be discovered for at least a fortnight after this date, and it is probable that the cold, wet weather which occurred at that time greatly hindered their emergence. These notes refer to the Wisbech district; at Alcester, Mr. Travell reported the first appearance of the bugs on 27th April, and it is probable that they continued to emerge for at least the following fortnight. It seems evident then that the period during which the bugs are hatched and the blossoming period of the apples may to some extent coincide, which will tend to increase the difficulties of dealing with the bugs by spraying.

With reference to the species of bugs concerned, the records in the case of the Wisbech district refer essentially to the green bug—*Plesiocoris rugicollis*—which has previously been shown to be the chief culprit. The dark-coloured, brown, black, or sometimes red bug *Psallus ambiguus*, which is not regarded as injurious to the fruit, hatches at about the same time. Owing to the great difficulty in distinguishing the young of *Orthotylus marginalis*—the other green bug under suspicion—from those of *Plesiocoris rugicollis*, no observations on its first appearance can be offered; in fact it was only by means of subsequent breeding experiments that the insects first noted at Wisbech were definitely identified.

These breeding experiments were as follows: young bugs were caught in the Wisbech district during the beginning of May and sleeved (*i.e.*, caged in loose, muslin sleeves) on dwarf apple-trees growing in pots—the varieties being Grenadier, Allington Pippin, Lord Derby and Lane's Prince Albert, all known to suffer from the attack. Each bug was sleeved by itself on a truss or young shoot and observations were then made on the damage done. As a result, all the green bugs which were so treated produced typical capsid injuries to the



Photograph of Allington Pippins illustrating degrees of intensity of attack of Capsid Bugs on apples

Fig. 1, Grade 1 Fig Grade Fig Grade 3 Fig 4 Grade 4

shoots, and, so far as the experiments went, to the fruit—though the latter, owing to insufficient feeding or underthinning, fell off when about half-grown. The young apples which had been sleeved with green bugs showed developing cracks and scars exactly like those noted in the open on attacked apples of the same stage, while apples not so treated were undamaged. The green bugs which were responsible for this injury in every case (24) were identified when adult as *Plesiocoris rugicollis*. The exact damage produced by the other green bug *Orthotylus marginalis* could not, therefore, be studied. It was also noted by means of similar experiments that the brown bugs *Psallus ambiguus* and *Atractotomus mali* of which the latter has been regarded with considerable suspicion, produced no damage to the fruit, and that in these experiments even their feeding punctures on the leaves were not of any importance.

The evidence obtained during 1916, therefore, supports the conclusions previously drawn—to the effect that the most serious pest is the green bug *Plesiocoris rugicollis*—while the brown or red species of the genera *Psallus* and *Atractotomus* are harmless, or at most only of secondary importance.

With reference to the variation in susceptibility to injury shown by different varieties of apple it must be recorded that in 1916 Early Victoria (Emneth Early) and Bramley's Seedling proved less resistant than in former years, and it is no longer possible to name any variety which may not at times be seriously damaged. The resistance previously noted does not imply that the bugs themselves prefer one variety to another, but rather that in certain varieties the powers of recovery are much greater, the punctures healing rapidly without the production of scars. Such powers of recovery are probably dependent not only on the constitution of the variety but also on the season, and it is quite possible that in more favoured years these two varieties may again show a comparative immunity.

As regards other plants attacked by Capsids, it was mentioned in the previous account that red currants were occasionally injured by the green bug *Plesiocoris rugicollis*, but it was not known then whether eggs were laid, and whether the entire life history was passed on this plant. During 1916, there appears to have been a marked extension of this attack on currants, notably, however, on black currants. A number of cases were reported in which almost every leaf showed the typical brownish spots, and the foliage from a distance appeared discoloured as if by a bad attack of Red Spider. In several of these cases there were no top trees, and young, wingless bugs were numerous, from which it may be deduced that the insects had emerged from eggs laid on the currants. In the previous cases which had been examined, the currants were growing under attacked apple trees, and there was, therefore, the possibility that the currants had only been adopted as a secondary food plant by individual bugs which had fallen from the apple trees. This theory is evidently incorrect, and Capsid bugs must be regarded as a definite pest of both black and red currants.

Finally, reference may be made to one of the strange features of these Capsid attacks, of which the currant cases form a typical instance. In the district in which the injury to currants was most prominent, no single case of damage to apples has been recorded, although apples are widely grown. Similarly the bugs have been noted attacking willow trees, the branches of which were actually touching those of an apple and yet the latter was entirely neglected. Such observations all point to the fact that these Capsids are only now discovering that cultivated plants will suit their needs as well as, or better than their original wild food plants, and since they can live on such different forms as willow, apple and currant, there seems nothing to prevent a still further increase in their destructive activities, a prospect which must be regarded with some alarm.

Spraying Experiments.—1. *At Mr. Clayton's orchards at Walton Highway.*—The following experiments were carried out at Walton Highway, near Wisbech. The variety of apple was "Lord Derby." The trees were about 20 years old, and the orchard was under grass, the latter being sown down in 1912. These trees all suffered badly from Capsid attack in 1915. Each row contained 9 trees, and one or more trees in each row remained unsprayed.

Plot 1.—First 6 trees sprayed on 4th May, 1916.

Bordeaux arsenate..	5 lb.
Nicotine	3¼ oz.
Water	40 gal.

Plot 2.—First 7 trees sprayed on 4th May, 1916.

Lime sulphur	1 gal.
Nicotine	3¼ oz.
Water	40 gal.

Tree No. 6 was also sprayed on 1st June with

Lime sulphur	1 gal.
Nicotine	3 oz.
Water	40 gal.

Plot 3.—First 8 trees sprayed on 4th May, 1916.

Lime sulphur	1 gal.
Nicotine	3½ oz.
Lead arsenate	2 lb.
Water	40 gal.

Plot 4.—First 8 trees sprayed on 5th May, 1916.

Soft soap	2½ lb.
Paraffin soft soap	2½ ,,
Nicotine	3 oz.
Water	40 gal.

Plot 5.—First 8 trees sprayed on 5th May, 1916.
Mixture as Plot 1.

Plot 6.—Three trees at each end sprayed on 6th May, 1916

Soft soap	4½ lb.
Nicotine	3½ oz.
Water	40 gal.

Plot 7.—Three trees at each end sprayed 6th May, 1916.

Paraffin soft soap	4½ lb.
Nicotine	3 oz.
Water	40 gal.

Plot 8.—First trees not sprayed. Next 6 sprayed on 6th May.

Soft soap	4 lb.
Nicotine	3 oz.
Lead arsenate	1 lb.
Water	40 gal.

Trees 1 and 2 were also sprayed on 1st June with

Soft soap	4½ lb.
Nicotine	3 oz.
Water	40 gal.

Plot 9.—An attempt was made on 1st June to knock off the Capsids with sharp spray of water, but this proved unsuccessful.

Plot 10.—Several rows unsprayed.

N.B. :—The paraffin soft soap and the Bordeaux arsenate were purchased as such.

Five to 7 gal. of wash were used per tree. Mixture 1, used on Plots 1 and 5, caused some slight scorching of the leaves but very little harm.

All the above-mentioned spray fluids killed the Capsids which were covered with the wash, and it was noticed that in those washes which contained soft soap and nicotine the Capsids were killed very quickly. With lime sulphur and nicotine the Capsids were not killed so quickly.

After the spraying, many Capsids were found alive on the trees. These were probably not touched by the spray fluid, as many of them were present in the curled leaves of the young shoots where they usually feed. From this it will be gathered that, in order to kill a large percentage of the Capsids, spraying will have to be very thorough and large quantities of wash will be required.

The sprays applied on 1st June killed a large proportion of the Capsids, but at this date much of the damage to the fruit had already been done.

All the sprayed trees were separable from the unsprayed ones, as they made a much larger growth of leaves and shoots. This was to some extent due to the reduction of caterpillars by spraying. An examination of the trees in September showed the following results: Plots 1 and 5 carried the heaviest crop and suffered the least from Capsid attacks. Plots 4, 6, 7 and 8 were slightly more marked by Capsids than 1 and 5. Plots 2 and 3 were more marked than Plots 4, 6, 7 and 8.

All the sprayed trees were much cleaner than the unsprayed ones, in spite of the fact that the crop was a very small one. On many of the unsprayed trees all the apples were badly marked by Capsids.

It should be noticed that the sprayed trees have made much better growth than the unsprayed ones, and should reap the benefit of this in future years.

2. *Newton* (*Mr. F. Glenny*).—The block chosen for the experiment consisted of 10 rows, each containing from 30 to 35 trees of the varieties Grenadier and Allington Pippin alternately. The trees had been planted for about 6 years, but the presence of the bugs was not noted until 1914; the trees were inspected in 1915 when considerable damage had been done to the foliage and young shoots, and bugs were numerous, at least 80 per cent. being the species *Plesiocoris rugicollis*. In the early spring of 1916 it was evident that there would be a good show of blossom and, if conditions proved favourable, a sufficient crop to show with accuracy the effect of the different spray fluids, since in both Grenadier and Allington Pippin the fruit is extensively damaged. As has already been mentioned, bugs first appeared about the 25th April, but since the hatching seemed to be proceeding slowly spraying was postponed as late as possible—until the 8th May, when the blossoms were about to open. At this date bugs were hardly as numerous as had been expected from the damage done the previous year. The larvæ of the winter moth were beginning to appear, however, and the bugs often sheltered between the leaves which had been spun together and were, therefore, more difficult to observe. In the same manner they were also able to find considerable protection from the spray.

Spraying began on 8th May in dull, showery weather which, though not sufficiently bad to stop the work, must have reduced the efficiency of the sprays considerably. On the following day heavy rain made all work impossible and the spraying was not concluded until the 10th, when the weather had greatly improved.

The experiment was arranged as follows :—

Row.	*Date of Spraying.*	*Formula.*	*Comments.*
1	Half row on 10th May.	Lime ½ cwt., water 40 gal.	This row does not form part of the main experiments, but is included for reasons which will appear subsequently.
2	8th May	Nicotine (98–9 per cent) 3 oz., soft soap 4 lb., water 40 gal.	—
3	Unsprayed	—	Control.
4	8th May	Nicotine 2 oz., soft soap 4 lb., water 40 gal.	Light rain.
5	Unsprayed	—	Control.
6	8th May	Soft soap 6 lb., water 40 gal.	To test value of soap without nicotine.
7	10th May	Nicotine 2½ oz., lime sulphur (sp. g. 1·3,) 1 gal., water 40 gal.	A start was made with this mixture on 8th May, but heavy rain made the work useless, and it was all sprayed on 10th May.
8	Unsprayed	—	Control.
9	10th May	Resin 6½ lb., soda 5 lb., water 40 gal.	Only half row sprayed, as the resin was entirely precipitated by the hard water.
10	10th May	Formula as in Row 2.	The bad weather on 8th May made it advisable to test the formula under better conditions.

The sprays were applied by means of a small petrol engine giving a pressure of 60 lb. to 80 lb., and medium coarse nozzles were used on the lances. The amount of spray fluid used per tree worked out at a little over 3½ gal., but there was considerable wastage owing to the necessity of pumping out the pipes between each separate experiment, and if one spray fluid had been used throughout 3 gal. per tree would have been ample. Water was obtained from a well in a neighbouring dyke and was found to be excessively hard, so that 4 lb. of soap in 40 gal. of water were probably not sufficient and the resin wash was practically useless.

Four trees in Rows 2 and 4 were banded as for winter moths, for, although it did not seem likely that very young bugs would be knocked off by the spray, it was felt that the point should be tested.

Results.—The bands just mentioned were examined on the 10th, two days after the trees had been sprayed, but only one or two bugs were found on them, and it is evident that if any bugs were knocked off they never regained the trees. It did not seem, however, that the very young bugs were easily forced off the twigs, and the habit of jumping or falling when disturbed is probably not acquired until later.

Observations made during the application of the sprays showed that, as at Mr. Clayton's orchards, all bugs actually wetted by a nicotine spray were killed. The difficulty consisted in spraying with sufficient thoroughness to reach those insects which were sheltered in the trusses, under leaves, etc., or, in the present case, between leaves which had been spun together by winter moth larvæ. Further inspections were made on various dates during the summer and only slight differences could be detected in favour of those rows which had been sprayed with nicotine. On 3rd August, when the fruit was sufficiently large, a careful comparison was made with reference to the scarring produced by the bugs, and again the evidence was only slightly in favour of the nicotine-sprayed rows—notably Row 10, which adjoined a road, and so perhaps was more easily seen. It was then decided that the crop on the Grenadiers was too small to justify a final comparison when the fruit was picked, but that on the Allington's was better and was sufficient to give results, although, in view of the very slight differences which had so far been detected between sprayed and unsprayed trees, only negative results were anticipated. This final examination, made when the apples from the Allington's were picked, was carried out as follows: The apples from 12 trees in a row were picked into baskets holding approximately 2 stones of fruit. The contents of the baskets were first roughly compared and then two average baskets were selected for a more detailed examination, which consisted in grading the fruit in accordance with the damage caused by the bugs. Four grades (*see* Plate) were selected, of which Grade 1 contained those apples which were unmarked or hardly marked by the bugs. Grade 2 consisted of fruit which was scarred but not to such an extent as to cause any marked depreciation in its market value. Typical examples showed from two to five quite superficial scars. Grade 3 contained apples which were badly scarred and usually somewhat distorted in shape. Grade 4 contained fruit which was deeply scarred, much distorted and usually cracked.

In this classification, Grades 1 and 2 would contain marketable fruit, while 3 and 4 would rank as " bag stuff " only. It may also be noted that this grading, which was made solely on the intensity of the injuries caused by the bugs, corresponded almost exactly with a grading by size of fruit alone, *i.e.*, unmarked apples were large, badly marked apples small ; and it would appear that the attacks of the bugs not only spoil the quality of the fruit but produce a corresponding reduction in its size.

The results of this grading are given in the following table :—

1) Experiment.	(2) Grade 1.	(3) Grade 2	(4) Grade 3	(5) Grade 4.	(6) Grade 1 + 2. Marketable Fruit from 12 Trees.	(7) Grade 3 + 4. Bag Fruit from 12 Trees.	(8) Total Crop from 12 Trees.
	p.c.	p.c.	p.c.	p c.	Stones.	Stones.	Stones.
1. Limewash ..	28	26	36	10	14¾	12¾	27½
2. Nicotine 3 oz., soft soap 4 lb., water 40 gal.	45	31	18	6	31¼	10¼	41½
3. Control (unsprayed).	6	16	54	24	2	7	9
4. Nicotine 2 oz., soft soap 4 lb., water 40 gal.	14	20	56	10	6½	13	19½
5. Control (unsprayed)	13	21	52	14	4	7½	11
6. Soft soap 6 lb., water 40 gal. ..	24	19	49	8	4¾	6¼	11
7. Lime sulphur (sp. g. 1·3) 1 gal., nicotine 2½ oz., water 40 gal. ..	31	23	40	6	26	22	48
8. Control (unsprayed)	7	15	54	24	3¾	12¾	16½
9. Resin 6½ lb., water 40 gal. ..	14	14	56	16	3½	8½	12
10. Nicotine 3 oz., soft soap 4 lb., water 40 gal.	36	28	33	3	27¾	15¾	43½

In the first column the number of the row and the nature of the experiment are indicated. The second column contains the percentage of first grade apples calculated from the results obtained by grading the two average baskets. The third, fourth and fifth columns similarly show the percentage of apples which were classified as Grades 2, 3 and 4. Column six gives the weight in stones of marketable fruit, seven the weight of " bag " fruit, and eight the total crop obtained from the 12 trees which were examined.

The table as a whole needs little comment, and, from the commercial point of view, columns 6, 7 and 8 speak for themselves. It may also be of interest to draw attention to certain further results which are obtained by summarising columns 2, 3, 4 and 5.

In the first place the three unsprayed rows taken together gave an average of 26 per cent. good fruit and 74 per cent. bad, and an average crop of about 1 stone per tree. With this may be compared the two rows 2 and 10 which were sprayed according to the formula—nicotine 3 oz., soap 4 lb., water 40 gal. These rows gave an average of 70 per cent. good fruit and 30 per cent. bad, with an average crop of 3¼ stones per tree.

Row 7, nicotine and lime sulphur, gave a still larger yield, *i.e.*, 4 stones per tree, but the grading, 54 per cent. good and 46 per cent. bad, is not quite so striking, though the comparison with the control rows is still markedly favourable.

Row 4, in which the strength of the nicotine was considerably reduced, gave very poor results. This may be due to the rain which fell while the row was being treated or to the fact that the nicotine had been so far diluted that its insecticidal properties were lost, though the latter explanation is less likely in view of Mr. Travell's experiences.

Of the other treatments, Row 6, sprayed with soft soap alone, gave a crop of under 1 stone per tree, grading 43 per cent. good and 57 per cent. bad, which clearly shows that the nicotine is necessary and that soap alone is not sufficient. This is of some interest, since wherever bugs were found which had been wetted by the soap spray they were dead, and at first it appeared that soap alone might be effective.

Resin wash—used on Row 9—was also of no value, but in view of the hardness of the water the test cannot be considered satisfactory. The experiment was made as it was believed that any wash which left the foliage for a time in a sticky condition might be fatal to the young bugs, but since the resin was entirely precipitated as a thick curd before it reached the trees the point was not decided. Row 1, in which a lime wash was applied at a very late date, is included, since there is a distinct gain both in grading and crop as compared with the control rows. It is probable that the lime in this case smothered many of the newly-hatched bugs, and in further experiments it may be well to test it more thoroughly. It may be of interest to note that in spite of the condition of the trees, the blossom being almost open, the injury done could hardly be detected and had no permanent effect on the foliage or crop.

As a whole, in spite of the smallness of the crop and the generally unfavourable conditions under which the work was carried out, these experiments are a striking testimony in favour of nicotine.

3. *Spraying at Dunnington, Alcester.*—Mr. H. W. Travell has kindly given the authors permission to include observations made by him when experimenting with various washes against Capsids. Specimens received in 1915 appeared to show that in his orchards *Plesiocoris rugicollis* is the predominating species, though *Orthotylus marginalis* is also present. Mr. Travell writes that owing to the weather he was unable to begin spraying as early as he wished, and that when a start was made considerable damage had already been done.

His experiments were as follows :—

1. " About 60 trees of Early Victoria, the trusses just about expanding, were washed with nicotine and soft soap " made according to the following formula :—

Nicotine, 98 per cent.	5 oz.	*i.e.*	2 oz.
Soft soap	8 lb.		3 lb.
Water	100 gal.		40 gal.

Several control trees were left unwashed, and "it was found upon examination that the majority of the bugs were destroyed, it being rather difficult to find any live ones after the washing. On examining the unwashed trees several weeks afterwards they were found to be only a very little more affected than the ones which had been washed." Mr. Travell considers that the damage was done before he was able to begin spraying.

2. " About 40 Early Victorias were washed with paraffin soft-soap mixture directly after the others had been treated with nicotine and soft soap." Mr. Travell states that " This wash did not prove nearly so successful as the former, a large number of the bugs being seen alive afterwards. In both cases the trees were well drenched with the wash."

3. Two hundred and fifty Worcester Pearmains were washed with nicotine and soft soap on 16th May. " Shortly after spraying a large number of bugs were observed to be killed."

Mr. Travell finally draws the following conclusions :—

1. " Washing should commence as soon as the bugs are observed. The damage is done very quickly and over a large area, the bug being so active."

2. That after trying various washes (in addition to those mentioned above) " nicotine and soft soap proved by far the most effective."

3. That the pest is very much on the increase. "Bramleys, Early Victorias and Newtons, which were hardly touched last year, were badly attacked this season." Also "some black currants which are near the affected apple trees have their leaves punctured in the same manner."

General Conclusions.—Summarising the conclusions which may be drawn from the experiments as a whole it is clear that nicotine, even when highly diluted, is fatal to the bugs and is the best insecticide to use. It may be applied in conjunction with soap, lime sulphur or Bordeaux, but the choice must depend on local circumstances as, for instance, on the presence or absence of scab or on the nature of the water available, which, if very hard, may make the use of soap inadvisable. The expense of nicotine is often put forward as an argument against its use, but provided it attains the desired object this argument seems faulty. In the experiments at Newton, for instance, the nicotine and soap wash containing 3 oz. of nicotine to 40 gal. of water cost just over 1*d.* per gal., but in normal times would be just under 1*d.* Each tree if sprayed commercially would have required about 3 gal. of wash costing 3*d.*, as compared with about 1½*d.* if a cheap wash had been used. The yield per tree even in a bad season was increased from 1 stone to 3½ stones, while the quantity of sound apples was increased from 26 per cent. to 70 per cent. Such increase both in quality and crop would seem to justify not only the labour, which is the same whatever wash is used, but also the selection of an insecticide of proved efficiency even if it is expensive.

Finally, a point arises from the Newton experiments which requires special emphasis. Up to the time when the crop was picked neither Mr. Glenny nor the authors of this paper were able to detect more than a slight advantage in favour of the nicotine-sprayed rows, and the results of a careful grading and weighing of the crop were a complete surprise. It seems evident then that in Capsid attack the gain from spraying cannot be judged by even a thorough examination of the sprayed and control plots, and that before any experiment can be considered to have failed it is essential that the fruit should be weighed and graded in accordance with the damage done by the bugs.

THE OVERHEAD ELECTRIC DISCHARGE AND CROP PRODUCTION.*

PROFESSOR V. H. BLACKMAN AND I. JÖRGENSEN.

Imperial College of Science and Technology.

Description and Treatment of Selected Area.—The experiments upon the effect of the overhead electric discharge upon crop production were continued during 1916 at Lincluden Mains Farm, Dumfries. These experiments, as in previous years, owe much to the careful way in which they were carried out by Miss E. C. Dudgeon. As in 1915, oats were chosen for the experimental crop. A large field of nine acres which in the past had given uniform crops was selected; the soil was a sandy loam.† The field had been in pasture without manure for the three previous years, having been grazed by cattle and occasionally by sheep.

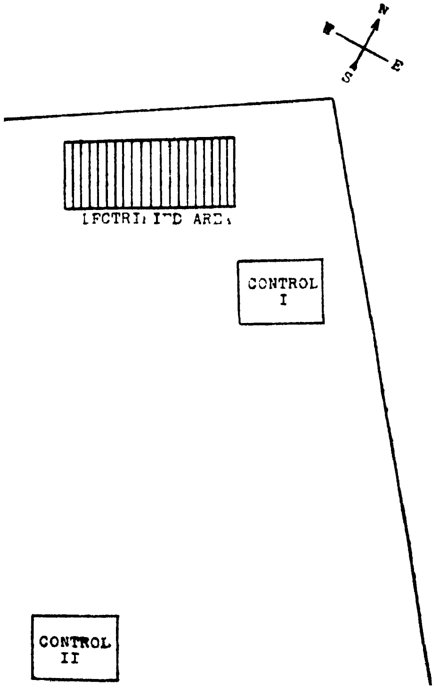


Fig. 1.

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* Previous accounts of investigations will be found in this *Journal* for April, 1910, p. 16; January, 1912, p. 862; October, 1913, p. 582; January, 1915, p. 944; and October, 1916, p. 671.

† The Lincluden district has a thin coating of glacial débris on a deep sandy foundation.

Of this field one acre was selected as the electrified area, and two half-acres were chosen as controls. The relative position of the three plots in the field is shown in the accompanying diagram (Fig. 1). Control I. was not far from the electrified area, but, as measurement showed, it received only a slight discharge when the wind blew from the west and north-west. Control II. lay south-east of the electrified, area and so was out of the track of the prevailing westerly winds; also, it was at such a distance from the electrified area that even with north-west winds it received practically no discharge.

The difficulty of confining the discharge to the special area to be electrified is much reduced by keeping the wires low.* The "earthed" screen of wire netting, which was used in previous experiments to prevent the spread of the discharge to the control areas, was found in 1916 to be unnecessary owing to the low position of the discharge wires and the distance and position of the controls.

The overhead discharge was applied by means of a series of 21 wires running parallel to the short sides of the rectangular area (88 by 55 yd.), the wires being thus about 4½ yd. apart. The wires were supported at their ends at a height of 7 ft. from the ground, but, towards the close of the experiment, sagged downwards at the centre to a height of only 6 ft. The current supplied through the primary circuit was about the same as in previous years, namely, 3 ampères, at 50 volts, but owing to the lower level of the wires (7 ft. as compared with 10 ft. in 1915, and 15 ft. in 1914) and the closed arrangement of the wires (13½ ft. as compared with 15 ft. in 1915, and 20 ft. in 1914) the intensity of the discharge received by the crop was much increased.†

Effect of Electrical Discharge on Crop.—The crop was sown on 27th March, and appeared above ground on 13th April, the discharge being started on 14th April. By 16th May there was a marked difference between the electrified and the control areas, the plants which had received the discharge being of a markedly deeper green colour and also taller. Measurements were taken at intervals of the average height of the plants on the three areas; the results are given in the following table:—

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* It has been shown by Jörgensen and Priestley (*Journal of Agricultural Science*, VI., 1914) that when the wires are fixed at a considerable height above the ground the wind may carry the discharge over a wide area.

† The intensity of the discharge received can be increased by (1) lowering the wires, (2) reducing the distance between the wires, (3) reducing the thickness of the wires. The wire employed was "silicium bronze" of gauge 24.

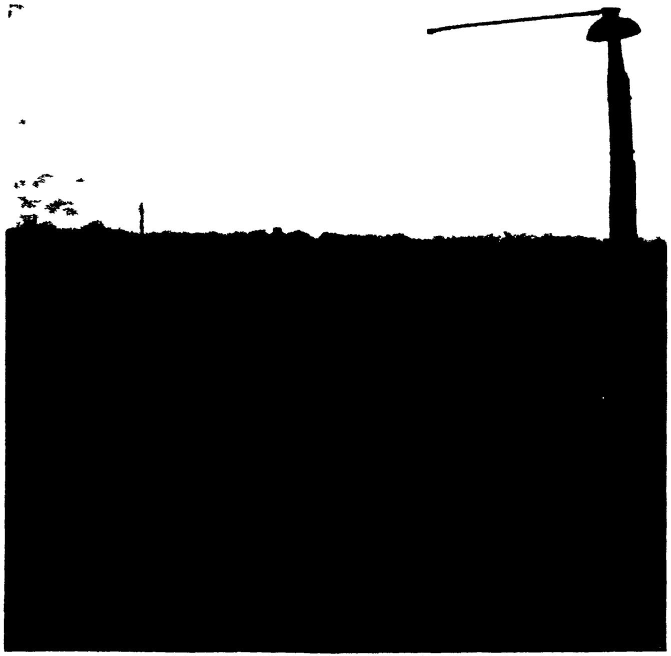

FIG 2

FIG 3

Photographs of Electrified (Fig 2) and Control (Fig 3) Plots taken on 8th August 1916 The figure standing in the crop is at the same distance from the camera in each case

	18th June.	*25th June.*	*3rd July.*
Electrified	19 in.	24 in.	32 in.
Control I.	14 ,,	19 ,,	21 ,,
,, II.	12 ,,	18 ,,	20 ,,

After 3rd July it was not possible to get among the plants without damaging the crop ; the measurements were therefore discontinued.

It was clear that the effect of electrification extended some little distance from the electrified area, for the height of the crop around the area was above the average and gradually decreased with increasing distance from the experimental area.

The discharge was continued until 17th August, being used only in the daytime and discontinued during actual rain. The discharge was applied for 848 hours altogether during the season.

The season was very good up to the middle of August and, as the photographs (Figs. 2 and 3) taken on 8th August show, the electrified crop was markedly taller than the rest of the field and much heavier in grain ; it was generally agreed that it was the finest crop of oats in the district. Unfortunately, heavy rain storms set in during the latter part of August and caused considerable "laying" of the heavy electrified crop, and also delay in cutting. This led to failure to garner the whole crop, owing mainly to loss of grain before harvesting. The crop was cut on 28th and 29th August, carted on 11th September, and threshed on 12th September.

The yields obtained on harvesting are given below for the electrified area and the two control areas. The grain was weighed as a whole, and the result is given in bushels of 42 lb. ; in the case of the straw every tenth "bunch" was weighed. and the weight of the whole crop calculated from the average weight of the "bunches" so obtained.

	Grain.			*Straw.*	
Electrified Area (1 acre).	62·8 bush. (2,637 lb.)	Qual. 1	1,942 lb.	4,924 lb. (316 bunches, av. wt. 15·6 lb.	
		,, 2	695 ,,		
Control Area I. (½ acre).	20 bush. (840 lb.)	Qual. 1	630 lb.	1,218 lb. (99 bunches, av. wt. 12·3 lb.	2,619 lb.
		,, 2	210		
Control Area II. (½ acre).	22 bush. (924 lb.)	Qual. 1	714 lb.	1,401 lb. (103 bunches, av. wt. 13·6 lb.	
		,, 2	210 lb.		

The electrified area, as compared with the control areas, gave an increased yield of 20 bush. (840 lb.) of grain (14 bush. of first quality and 6 bush. of second quality) and 2,305 lb. straw. Calculating the percentage increase over the two control areas we obtain the following result :—

Increase in grain, 49 per cent.
,, straw, 88 ,,

hay had been cut in July, 1916. The difference between the growth of the clover on the two areas is very well marked. This question of "after effect" will be investigated in future experiments. It is to be noted that this field had been well limed before the oats were sown.

If, in addition to an immediate increase of the treated crop, the electric discharge may also benefit a succeeding crop, it is obvious that the agricultural value of the application of the discharge becomes very much enhanced.

Problems still Needing Investigation.—Before, however, the use of the overhead electric discharge can be recommended to farmers, more knowledge on many points must be available. The conditions under which the effect is produced—its relation to light, humidity of the air, etc.—have to be studied. The most suitable strength of discharge has yet to be discovered; the experiments suggest that with a greater intensity of discharge still bigger yields might be obtained. The manurial conditions best suited to crop production under the discharge, and the question as to the possible effect of various types of soil, have yet to be investigated. Electrical engineering problems also arise as to the most economical methods of producing the necessary high tension current. There is also the question of the manner in which the electric discharge influences the growth of the crop—a question which is still quite unsolved.

CROPPING A TEN-ROD ALLOTMENT.

A. W. ASHBY.

MANY people who have not previously had a garden are now endeavouring to grow vegetables on an allotment, and some are, naturally enough, puzzled as to what quantities of the different kinds of vegetables it is possible to grow. Many people, also, are in need of guidance as to what quantity of seed to purchase or what the seed should cost. As an attempt to provide guidance for the inexperienced the following plans have been prepared. They are based partly on an assumption that most people will desire to grow several of the simple crops in addition to potatoes, and partly on the expectation that many people will not be able to obtain sufficient seed potatoes to plant more than half their respective allotments with this crop. Thus in Plan I. the ground allotted to potatoes amounts to a little less than half the 10 rods, or just over 4½ rods. This area can easily be increased at the expense of other crops, and, in particular, in place of peas, for which the ground allotted adjoins the potato patch.

Where manure is not too plentiful, legumes, *i.e.*, peas and beans, are of great value, since they collect nitrogen for other crops ; hence the apparently large area devoted to these crops. After they are removed the ground may be dug and prepared

PLAN I— Cropping a 10 Rod Allotment

No of rows	Crops	Distance between rows	← 33 ft → Approximate number of Plants	Space Allotted
3	Parsnips	15 ins	150	3 ft 9 ins
3	Carrots	12 ins	230	3 ft 3 ins
4	Turnips	12 ins	132	4 ft
2	Beetroots	12 ins	66	2 ft
6	Onions	12 ins	400 small to 600 medium size	6 ft
4	Broad Beans	18 ins	At 4 ins 400 At 6 ins 260	6 ft
3	Dwarf Beans	18 ins	99 (or Early Brussels, 36)	4 ft 6 ins
2	Runner Beans	3 ft	At 6 ins 132 At 9 ins 88	6 ft
3	Early Mid Season Late Peas	3 ft	At 2 ins 600 At 4 ins 300	9 ft
4	Early Potatoes	2 ft	At 12 ins 32 per row At 9 ins 42 per row	8 ft
4	Second Early Potatoes	2 ft 6 ins	At 12 ins 132 (Brussels Sprouts, 16 per row)	10 ft
8	Main Crop Potatoes	2 ft 6 in	At 12 ins 32 per row At 15 ins 26 per row At 18 ins 22 per row (Kale etc, 16 per row)	20 ft
			Total	82 ft 6 ins

← 82 ft 6 ins →

for the small seeds of the following season, and for the second year the potatoes may be removed to the other end of the allotment, while the legumes should be removed to the patch now set out for potatoes. If a white variety of dwarf or runner beans* can be obtained, and the crop is plentiful, the seed can be gathered and prepared as haricot beans for winter use. The coloured varieties may also be used in this way if no objection is taken to the colour. The preparation consists solely of gathering the pods when they become yellow and drying them in the sun, afterwards stripping the beans and storing in a clean, dry place for winter use.

Many variations of the proposed plan are possible, according to the state of the soil, the time at the disposal of the cultivator, and his taste and experience. No ground has been set out for such crops as spinach, leeks, celery, etc., nor for salad crops, except as regards use of vacant ground between peas and beans. The crops indicated are the staple crops of the garden, and such as may be grown on fairly good soil, with a little care and attention, without any great risk of failure. With good fortune they should yield a more or less continuous supply of vegetables for a small or medium-sized family during the greater part of the year.

The space allotted to onions may appear too large for many growers, but in working-class families a large number of stews may be necessary. In these the onion is an integral part. This crop may be reduced to 3 or 4 rows as suggested in Plan II., but should not be reduced below 3 rows when stews are an important item in the dietary of the family. With short supplies of imported onions they will be expensive to purchase, and with the necessity for making the best of the meat supplies the produce of 3 or 4 rows will not provide a superabundance. The elimination of 2 rows of onions and the beetroot, as recommended in Plan II., will provide for 3 more rows of parsnips or 2 more rows of parsnips and an extra row of carrots. Where potatoes do not exceed 4½ or 5 rods an addition to the parsnip area is strongly recommended, since, with the exception of potatoes, this crop produces greater weight and food value than almost any other crop which can be grown for winter use.

With the omission of a little space on the border of some of the beds room may be found for 2 or 3 bush marrow plants, or plants of the trailing variety may be set at the end of the space intervening between peas or beans. If other vegetables are plentiful during the summer the marrows may be allowed to ripen, when with proper care they will keep till the early months of winter.

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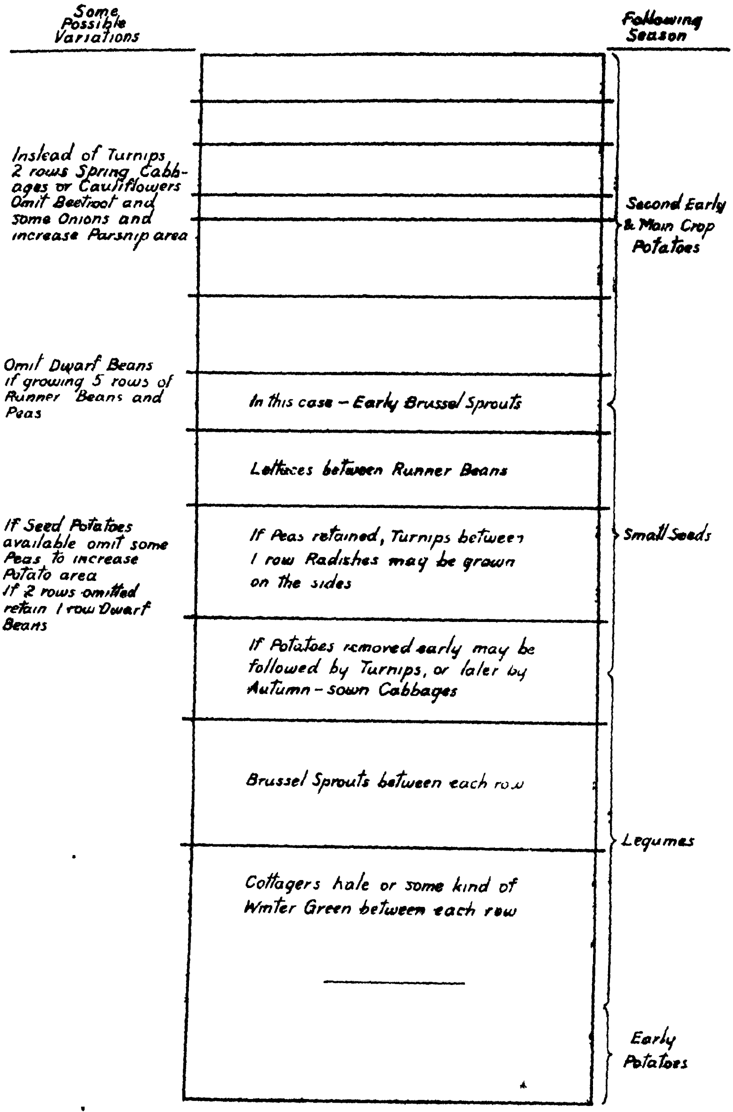
* *White Dwarf*: Early White or Brewer's White, White Dutch, Dutch Long Pod, Early Dwarf Dutch, American White, and Haricot Suisse. *White Runners*: Large Running White, White Long Pod, Large White Sugar, and Sabre.

PLAN II — Between Cropping or after Cropping of a 10 Rod Allotment.



Instead of Turnips 2 rows Spring Cabbages or Cauliflowers Omit Beetroot and some Onions and increase Parsnip area

Omit Dwarf Beans if growing 5 rows of Runner Beans and Peas

If Seed Potatoes available omit some Peas to increase Potato area If 2 rows omitted retain 1 row Dwarf Beans

In this case – Early Brussel Sprouts

Lettuces between Runner Beans

If Peas retained, Turnips between 1 row Radishes may be grown on the sides

If Potatoes removed early may be followed by Turnips, or later by Autumn-sown Cabbages

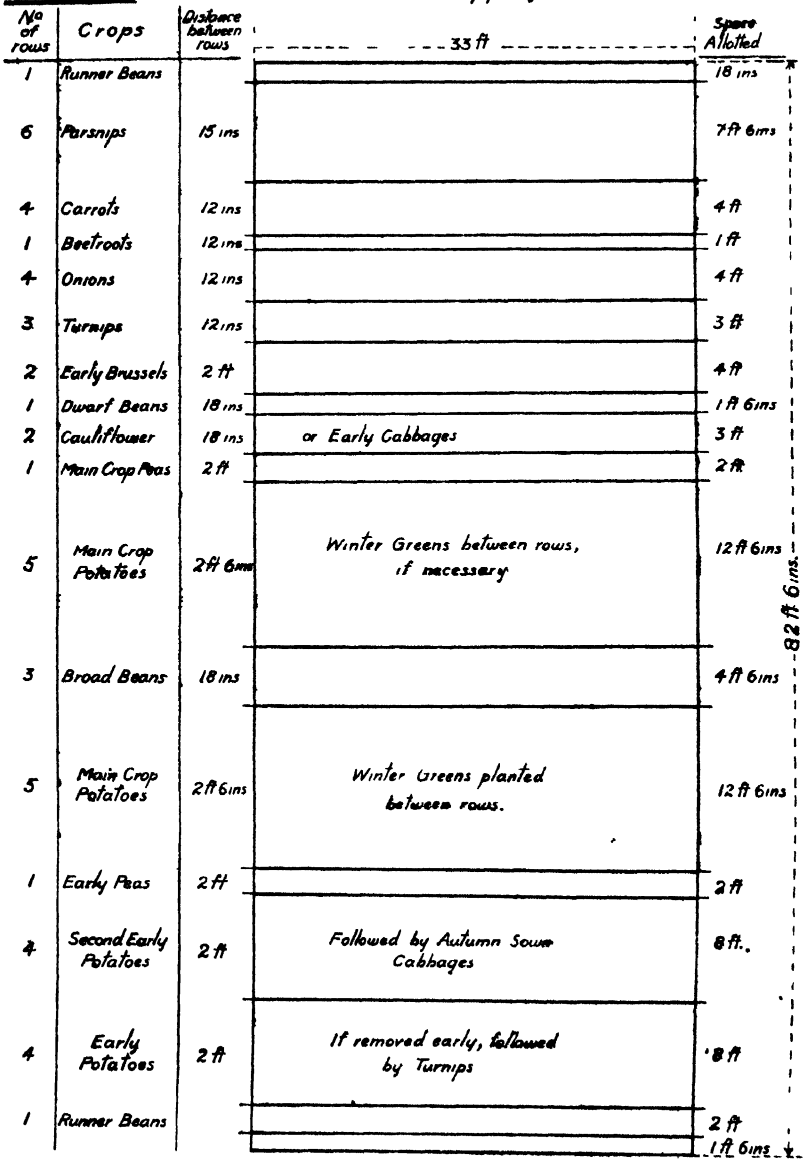
Brussel Sprouts between each row

Cottagers Kale or some kind of Winter Green between each row

For the success of the after crops such as Winter Greens fairly liberal manuring will be necessary. Two loads of heavy dung applied before first planting would be sufficient, otherwise some fertiliser would be required after removal of potatoes

Expert gardeners may object to the plan outlined as regards the location of the space provided for peas and beans. The appearance of the allotment would certainly be better balanced if these crops were distributed over the plot—for example, 1 row of runner beans adjacent to each end, and 1 row of peas

PLAN III.— Elaborated Plan of Cropping a 10 Rod Allotment.



No. of rows	Crops	Distance between rows		Space Allotted
1	Runner Beans			18 ins
6	Parsnips	15 ins		7 ft 6 ins
4	Carrots	12 ins		4 ft
1	Beetroots	12 ins		1 ft
4	Onions	12 ins		4 ft
3	Turnips	12 ins		3 ft
2	Early Brussels	2 ft		4 ft
1	Dwarf Beans	18 ins		1 ft 6 ins
2	Cauliflower	18 ins	or Early Cabbages	3 ft
1	Main Crop Peas	2 ft		2 ft
5	Main Crop Potatoes	2 ft 6 ins	Winter Greens between rows, if necessary	12 ft 6 ins
3	Broad Beans	18 ins		4 ft 6 ins
5	Main Crop Potatoes	2 ft 6 ins	Winter Greens planted between rows.	12 ft 6 ins
1	Early Peas	2 ft		2 ft
4	Second Early Potatoes	2 ft	Followed by Autumn Sown Cabbages	8 ft.
4	Early Potatoes	2 ft	If removed early, followed by Turnips	8 ft
1	Runner Beans			2 ft 1 ft 6 ins

Ground occupied by Potatoes, approximately 5 Rods about 10 yd. from each end, with the broad beans somewhere near the middle of the plot. There is some advantage to the crops themselves in this open system of planting, for yields increase with the amount of air and light available for each row. Wherever it is possible to arrange for these crops to be planted in the direction north to south they yield much better, runner beans especially benefiting from this arrangement. Where, however, the plot is not laid out so that this becomes the general direction for all rows, most gardeners prefer not to disarrange other crops to provide for this direction for peas and beans. The open system of planting is indicated in Plan III. The objection to this treatment is that where manure is not plentiful the value of rotation—following legumes by next year's small seeds—is not obtainable.

This plan is not intended in any way as a hard and fast rule of cropping. It is drafted simply as a guide to what quantity of crops it is possible to grow on the space of a 10-rod allotment. A word of caution is, perhaps, necessary as to the distance between rows of the various crops. On heavy soil, where it may be necessary to hoe frequently, or where big crops of weeds are expected, it may be desirable to increase the distances given in the plan for small seeds, thus reducing the total number of rows.

For the following estimate of the cost of seeds and plants necessary for the plots indicated the writer is indebted to Mr. Arthur Rowles :—

Seeds and Plants required for a 10-rod Allotment.
(Including some dual cropping.)

	Length of Row, 33 ft.	1917. *Estimated Cost.* *s.*	*d.*
First Planting.			
3 rows	Parsnip seed	0	2
3 ,,	Carrot ,,	0	3
4 ,,	Turnips ,,	0	3
2 ,,	Beetroot ,,	0	3
6 ,,	Onion ,,	0	9
	Or plants, per score	0	4
	(2 rows plants, 40, 10*d.*) (4 rows seed, 6*d.*)		
4 ,,	Broad beans	0	7
3 ,,	Dwarf ,,	0	8
2 ,,	Runner ,,	0	9
3	Peas	1	8
4	Early potatoes	3	6
4	Second early potatoes	3	6
8	Main crop potatoes	6	0

Variations or following Crops.			*s.*	*d.*
2 rows	Cabbages	(per score 3*d*.)	0	6
	Or Cauliflowers	(,, 3*d*.)	0	6
2 ,,	Early Brussels	(,, 2½*d*.)	0	5
2 ,,	Lettuces	(,, 3*d*.)	0	6
2 ,,	Radish seed		0	2
6 ,,	Turnip ,,		0	4
	Or cabbage plants, 4 score		0	10
4 ,,	Brussels plants, 3½ score		0	7
4 ,,	Winter green plants, 3½ score		0	7
4 ,,	Autumn-sown onion seed, if desired		0	5

It would be possible to indicate the yields which might be expected from the space allotted to each crop, but in view of the diversity in the soils and the experience of cultivators this is not considered desirable, as ill-founded hopes might be raised by such estimates. The plan and variations should provide a guide for inexperienced cultivators; and with care and the best use of facilities yields will be found more than sufficient compensation for the trouble incurred in their production.

Manures, etc.—A few notes on fertilisers and common materials, some in the nature of waste, which are of use on allotments may also be of assistance.

Dung is the best all-round manure for garden purposes, and may be applied at the rate of 10 cwt. and upwards per 10 rods. This quantity is equal to 8 tons per acre, and from 1 to 2 tons, according to the state of the soil, will be found to be a useful dressing on an allotment of this size. Dung varies considerably in weight according to its origin. Light stable manure may not weigh more than 8 or 10 cwt. per cart-load, while rich cow or pig manure may weigh 15 cwt. upwards. Two loads of stable manure will provide a fair dressing for 10 rods, and 2 loads of the heavier manure will be a heavy dressing.

Lime.—Heavy, clay soils and sandy soils will benefit by a dressing of lime. This may be applied at the rate of 2 to 5 bush. per 10 rods. Lime is best applied before the crop is planted Thereafter it may be sprinkled on the top of the ground in small quantities as a check to slugs, snails, etc. *Fresh gas-lime* is injurious to vegetable life, and when used should be applied some weeks (say 2 months) before planting. About 7 lb. per rod is a useful dressing, and will be found to be a good insecticide.

Artificial Manures.—There are many kinds of artificial manures which are normally used as substitutes for, or in addition to, natural manures. These are classified in three main groups according as they contain large quantities of (1) *nitrates*, (2) *phosphates*, (3) *potash*. The gardener may take as a guide to their use the principle that nitrates produce fine, luxuriant foliage, *e.g.*, they are useful for the cabbage and similar crops; phosphates induce earlier production of fruit and flowers, and will be found most useful with beans and peas amongst the vegetable crops, although they may be useful with such crops as turnips, parsnips, etc.; while potash increases the substance and improves the quality of fruits, tubers and roots, and will be found very useful with potatoes.

Guano has been the best all-round artificial fertiliser for garden purposes, as it contains all three of the plant foods mentioned in the last paragraph. Now that it is practically unobtainable pigeon and poultry dung are good substitutes, and allotment holders who can obtain these should take great care of them. They contain all three of the chief plant foods in varying quantities, pigeon dung being especially rich. This may be applied at the rate of 4½ to 7 lb. per rod (or approximately 6½ to 10 cwt. per acre), the heavier dressing being given when available. To ensure equal distribution it may be mixed and pulverised with some fine, dry material, such as earth-ashes or very fine coal-ashes. This also applies to poultry dung, which should be applied at the rate of 7 lb. and upwards per rod.

Soot is a useful nitrogenous manure, and in some cases, as when fine ashes are naturally intermixed. contains small quantities of potash and phosphates. On the other hand, the admixture may be valueless, so that in purchasing, the pure, light soot should be sought. Quality may be judged by lightness. and a good sample should not weigh more than about 28 lb. per bush. It may be applied at the rate of 2 bush. per 10 rods, or up to 7 lb. per rod. Soot is very valuable as an insecticide, and may be dusted round plants to ward off slugs, beetles, etc.

Wood Ashes contain considerable amounts of potash and will be found very beneficial to potatoes. As these are usually available only in small quantities, about 4 lb. per rod should be applied, the quantity being increased if the supply is plentiful.

Coal Ashes are not recommended unless they are quite free from cinders, however small. In the finest state they contain potash and very small quantities of phosphates, and may be applied to potatoes and root crops at the rate of 28 lb. per rod. When they contain cinders they should not be used, except perhaps on the heaviest land, where they are of assistance in keeping the soil open. In this case the largest cinders should be removed.

Salt applied at the rate of 2 to 3 lb. per rod acts as a severe check to slugs, etc. It is also useful on beetroots, and, as a light dressing, on onions and the cabbage family.

Basic Slag, a phosphatic manure, will be found very useful on peas, all kinds of beans, and root crops. It should be applied at the rate of 3½ to 7 lb. per rod, if possible before planting. It is a slow-working fertiliser, but in gardens where moisture and humus (decaying vegetable matter) are plentiful it will readily become available for plant food.

Sulphate of Ammonia, a nitrogenous manure, may possibly be obtained. It should be applied at the rate of 1 to 2 lb. per rod, and will be found useful on all crops except legumes. Basic slag and sulphate of ammonia may be more easily obtained by co-operative purchase by a group of cultivators. These two substances should not be mixed.

Waste Substances.—In some localities wool waste, fish meal, meat meal, dried blood, rape dust, bone meal, etc., may be obtainable. In this case local experience may provide information as to use and the quantity to be applied. There are many other fertilisers such as superphosphate, nitrate of soda, kainit, muriate of potash, etc., which cannot now be obtained, or only with great difficulty and expense. A word of warning may be uttered against prepared " plant foods " and fertilisers sold in tins. Many of these are certainly what they purport to be, but even so their cost is often entirely disproportionate to their value to the gardener. When they are not what they purport to be money is wasted. With dung and lime, and perhaps a little soot for top-dressing, the allotment cultivator can prepare his land for most crops.

EXPERIMENTS WITH PEPSIN TO REPLACE RENNET.

D. W. STEUART, B.Sc.
(University College, Cardiff).

IN view of the shortage and high price of rennet, the Agricultural Department of University College, Cardiff, decided to give pepsin a trial. A London firm kindly sent 1 oz. of their 1:3,000 soluble pepsin powder for that purpose. From this it was desired to produce a solution which would be as similar as possible in composition and strength to standard rennet extract, which could be used in exactly the same way as rennet, and which would keep. A 10-oz. dark-coloured bottle (a " poison " bottle from the druggist's) was thoroughly washed and scalded, then allowed to cool, and the 1 oz. of pepsin powder put into it. Then 50 grammes of salt, 5 grammes of boric acid, and 250 grammes of water were brought to the boil in an Erlenmeyer flask (water and salt often contain germs, so this treatment was necessary). The brine was cooled to 105°F., put into the bottle, corked with a new cork, the whole shaken violently, and then, without any preliminary filtering, sent to the dairy to be tested. Miss Annie Pritchard, N.D.D., reported as follows : The solution gave a 17–18-second rennet test as against 22 seconds with rennet extract. On standing a sediment settled. When shaken up for use the solution was very cloudy. The pepsin solution was tested against rennet on four different days for making Caerphilly cheese. The pepsin acted in about 7 minutes, and the curd was ready to cut in 45 minutes ; the rennet acted in about 15 minutes and the curd was ready to cut in an hour. Even then the pepsin curd was always the firmer when cut. Taking the four tests together, 16½ gal. of milk gave 18 lb. 9 oz. of curd with rennet, but 19 lb. 11 oz. of curd with the pepsin. The pepsin curd was therefore moister, due to the curd being firmer when cut. What remained of this unfiltered pepsin solution at the end of two months gave even a quicker rennet test, proportionately, than when it was new, showing that it had become somewhat stronger.

The solution was examined bacteriologically at the end of the first month. To three Durham's tubes containing MacConkey's litmus, lactose, bile salt, and peptone water, 1 c.c., $\frac{1}{10}$th c.c. and $\frac{1}{100}$th c.c. of pepsin solution were added, respectively, and the tubes were incubated two days at blood heat. There was no evidence of gas-producing coliform organisms. Then similar quantities of the pepsin solution were added to tubes of whey agar, plates were poured, and incubated three days at 37°C. Not a single colony of germs developed, suggesting that the solution was almost or quite sterile.

A second ounce of soluble pepsin powder was purchased for 1*s.* 9*d.*, and made up as before, but in the following proportions : 1 oz. pepsin, 68 grammes salt, 7 grammes boric acid, and 340 grammes water.

The whole was shaken violently. Next day the shaking was repeated. On the second day the solution was filtered through filter paper. The filtering took about 24 hours. The fluid was bottled as before and sent to the dairy.

Miss Pritchard's report this time was to the effect that the solution was fairly clear and showed no sediment. It gave practically the same rennet test as the rennet. It was compared with rennet for making Caerphilly, Smallholder and soft cheeses (Bondons, Pont L'Evêques, and Coulommiers). The results were entirely satisfactory, the pepsin solution and rennet being of equal strength and having the same effect.

A pair of Caerphilly cheeses made on 20th February, each from 2 gal. of milk, were sampled on 8th March. The two cheeses differed in weight only by an ounce. There was practically no other difference between the pepsin and the rennet cheese. The first batch of Caerphilly cheeses was sold to Mr. Richard Thomson of the Direct Trading Company at 160*s.* per cwt., the then ruling price for first quality Caerphilly. On the 22nd of March, Mr. Thomson examined the cheeses and considered all of them to be entirely satisfactory. Three pairs of cheeses made on 28th February, 1st March, and 6th March, respectively, were selected, and it was explained how they differed. Mr. Thomson was unable to detect any difference between the rennet cheese and the pepsin cheese of each pair

The trials suggest that a gallon of rennet solution of standard strength can be made by mixing the following ingredients :—

13½ oz. of the firm's 1-3,000 soluble pepsin powder ;
2 lb. salt ;
3 oz. boric acid ; and
1 gal. water.

The brine must be cooled to 104°F., after boiling, before dissolving the pepsin. The solution may be filtered after a day or two. It will keep well. With pepsin at 22*s.* per lb., a gallon costs 18*s.* 6*d.* The makers claim that 1 oz. of pepsin powder will curdle 300 gal. of milk. This is quite correct. It takes 12 oz. of standard rennet extract to equal 1 oz. of pepsin powder.

FORESTRY WORK FOR WOMEN:

RAISING FOREST-TREE SEEDLINGS.

MARY SUTHERLAND.

(Senior Forestry Student in Charge of the Forestry Seed-beds at Aber, North Wales.)

To make provision for planting operations after the War, the Board of Agriculture have sown large quantities of forest-tree seeds. The following is an account of the work at one of the nurseries, and indicates one type of forest work which may be carried out successfully by women's labour:—

A centre was established in the spring of last year, under the control of the Department of Agriculture of the University College of North Wales, Bangor, on the College farm at Aber, and for the greater part of the work female labour alone was employed.

The site chosen for the seed-beds was a field of about 2 acres, close to the shore of the Menai Straits, and quite unsheltered from sun and the prevailing west wind. The field, of which the soil was a moderately light loam, was ploughed, and harrowed in early spring, but if more time had been available would have benefited by still further cultivation.

The area was then measured out into seed-beds, these being 4 ft. 6 in. wide, with 1 ft. 6 in. paths between each bed. The beds were of a length varying with the shape of the field, the longest averaging 60 yd.

Several means of building up the beds were tried, and the method finally employed was that of taking out all the stones into the pathway, thus utilising them to harden the paths, and at the same time saving the labour of carrying away the stones.

The beds were brought to the necessary fine tilth by repeated raking over, and basic slag was raked in at the rate of about 10 cwt. per acre. This was followed, in the second week of May, by the sowing of the seed, this operation having been delayed by the bad weather.

Drills across the beds were marked out by means of a heavy wooden roller, of the same width as the bed, and having laths 2 in. wide affixed to the surface at intervals of 6 in. When drawn lengthways down the bed the roller left furrows 2 in. wide for the reception of the seed. The seed was sown evenly in the furrows, either from a seed-horn, or equally satisfactorily from an improvised horn made from a large glass bottle, having a wedge cut out of the cork, just large enough to allow for the passage of a few seeds at once. The seed was first coated with red lead to prevent it being eaten by mice and birds, and sowing was only carried out in fine weather when the soil was in a dry, friable condition suitable to receive and hold the seed. After distribution, a Spitzenberg drill roller was taken over each drill to cover the seed, and the whole operation was completed by drawing a light, wooden roller over the bed lengthwise to consolidate the surface.

A series of smaller beds was tried, the beds being formed by ploughing single furrows 1 ft. apart, to serve as paths. In the beds thus formed, seed was sown broadcast. These beds eventually entailed waste of land, as in subsequent weeding operations in wet weather they were gradually submerged into paths. In dry soils this method would probably bring failure through inability to conserve enough moisture in the seed-bed.

Seedlings of Norway Spruce, which was the first species sown, were through the surface about a month later, a month being the average time of germination of all the species, except Douglas Fir, which took considerably longer, delay being due to the spell of dry weather after sowing, and during July. Once the Douglas Fir seedlings had started, however, growth was very rapid, and by autumn the beds showed a crop of good, strong seedlings, though these were fewer in number than the quantity of seed should have produced.

The beds were first weeded when the seedlings were just showing, and the weeding was carried on continually all through the summer. As a rule, hand-picking was the only satisfactory method of cleaning the beds, the seedlings being so very small. The Dutch hoe was used between the rows later on, to prevent a further crop of weeds making headway. Towards autumn, the beds were hoed as often as possible, in order to cultivate the soil between the growing seedlings, and, by preventing caking of the soil-surface, leave it open to weathering. The large area of paths considerably increased the difficulty of keeping the ground clean; rough hand-picking was periodically necessary until a weed-killer was used, which effectively cleaned the paths at less cost than the labour previously involved.

During the three summer months, on an average 7 girls, and for a shorter time a number of school-children, were employed in tending the seed-beds. The employment of women in this work was eminently suitable, as it required patience, speed, and careful manipulation to carry it out with the minimum amount of damage and loss of seedlings.

Work was done on the seed-beds in all weathers, except extremely wet weather, when satisfactory weeding was not possible: during such wet weather indoor work was provided at the farm buildings. During spring and summer also the workers were engaged at times in helping with other farm work, *e.g.*, potato-planting, hay-making, and harvesting.

After the end of September work ceased on the seed-beds, as weed-growth had slackened, and the condition of the soil remained so wet that disturbance by weeding might have increased the danger from frost-lifting of the seedlings during the winter.

The number of seedlings obtained from the season's sowing was smaller than it should have been, probably owing to rather too thin sowing, and, in the case of Douglas Fir, to the bad germinating conditions prevailing. A light dressing of nitrogenous manure might have been employed to hasten the growth of the seedlings, as was done at other centres. Seedlings produced without forcing, however, were of considerably better quality, and formed hardier plants than those which were forced.

The accommodation difficulty was met by the provision by the Board of Agriculture of a furnished house as a hostel for the workers. Cost of food, and of cleaning and cooking, was shared equally by the inmates.

Work hours were 7.0 a.m. to 5.30 p.m., with half-an-hour off for breakfast at 8.30 a.m., and an hour for dinner at 1.0 p.m. Saturday afternoons were free.

Full arrangements were made for the comfort and well-being of the workers, and all possible help and consideration were given by Professor R. G. White and his staff on the farm.

The following figures show the estimated numbers of the growing stock and the quantities of seed sown:—

Species.	Total Number of Plants.	Number on 1 sq. yd. of Seed-bed.	Quantity of Seed Sown.	
			Total.	Per 100 sq. ft.
			lb.	lb.
Norway Spruce	304,000	159	139	0·8
Douglas Fir	209,000	87	97	0·4
European Larch	34,000	417	10	1·3
Japanese „	156,000	480	20	0·7
Total	703,000	—	266	—

WAR TIME PROFITS.

FARMING *versus* FORESTRY.

P. TRENTHAM MAW.

THERE has been so much discussion as to the profits which farmers are making, that it may be of interest to review the working of a small farm of just under 100 acres which the writer has managed during the last year.

The farm in question comprises about 28 acres of light, arable land, 9½ acres of which consist of very poor, sandy soil, and were at some time or other enclosed from waste heather land. One half the pasture is inferior, but the rest is of good quality. The buildings are inadequate, and the fields are very scattered, some being more than a mile away from others. There is, consequently, much waste of labour. When taken over, the farm, which had been entirely in the hands of a bailiff, was in a very bad state, as may be judged from the yield from the arable land as shown in the valuation at Michaelmas, 1915, thus:—

6¾	acres	under	mangolds	only	averaged	3½ tons per acre.
8¼	,,	,,	potatoes	,,	,,	8½ cwt. of ware per acre.
11¾	,,	,,	oats	,,	,,	22 bush. per acre.

The produce on hand at Michaelmas, 1915, was not sufficient to pay all cash expenses during the year.

It was decided to adopt a rather more up-to-date method of farming, if only for the sake of example, and the results, which show a *net profit of over* 54*s. per acre,* are not altogether disappointing, though very much still remains to be done.

A statement of accounts submitted to the Board gives a detailed financial survey of the year's operations and shows how the profit realised has been arrived at.* The statement shows that the profits were realised almost entirely from the arable land. This result is chiefly attributable to the use of good seed and the application of artificial manures to supplement a meagre supply of farmyard manure.

Crops Grown in 1916.—*Mangolds.*—A yield of nearly 24 tons per acre was obtained from 2½ acres of mangolds, which had formed part of the land under the same crop in 1915. The manures applied per acre were:—

11 loads dung.	4 cwt. superphosphate.
2 cwt. salt.	1 ,, nitrate of soda.

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* Certain points call for note: e.g., eating potatoes were valued at £9 per ton and seed potatoes at £4 13*s.* per ton only; 10 per cent. was deducted for depreciation on the value of the implements and horses; and the dairy cows were valued on a pre-war basis.—*Ed.*

Potatoes.—2¾ acres of potatoes yielded* :—

7½ tons best eating potatoes per acre.
1 ton 2½ cwt. "seed" " " "
19 " pig chats " "

The varieties grown were "Up-to-Date," "British Queen," and "King Edward," and the seed was obtained from Scotland.

The manures used per acre were :—

11 loads dung.
¾ cwt. nitrate of soda.
2 cwt. superphosphate of lime.
1 load poultry manure.

The crop was grown on the best of the arable land.

Rye.—7 acres of rye were grown after oats, but the crop was very inferior. The seed was sown very late, and 2 acres were an absolute failure owing to defective drainage; 1 cwt. of nitrate of soda was applied per acre.

The crop threshed out at only 19¼ bush per acre on the 5 acres. There is little doubt that the result would have been much better if 3 cwt. of superphosphate per acre had been applied in addition to the nitrate of soda, and if the seed had been sown in reasonable time. The field was in a very poor condition.

Oats.—The most interesting crop on the farm was one of oats grown on 7 acres of extremely poor sand and gravel. The area was at one time part of the adjoining heather moor which looks about as unpromising for agricultural operations as any land could do. There are no records of previous crops, except that of the preceding year, viz., potatoes. For this crop part of the land was dunged, but the yield of eating potatoes was less than the amount of seed used. However, this unfortunate result was partly due to the ravages of rabbits. In the spring of 1916 the area was fenced in, and the oats sown. The land was manured with :—

5 cwt. waste lime per acre, and
4 " superphosphate

also, *part* received about 10 loads of dung per acre, and the remaining part ¾ cwt. of nitrate of soda per acre.

The crop threshed out at just under 40 bush. per acre; the yield would have been greater had not considerable damage been sustained at harvest time.

Adjoining this area, on one side, is a plantation of Scots Pine which is, according to the writer's yield tables, approximately "Quality II" for Scots Pine.† The results achieved upon the land under the plough afford one of many proofs, coming within the writer's experience, that such land had far better be devoted to husbandry than afforested.

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* The area on which these yields are based includes vacant land taken up by headlands.

† P. T. Maw's "Complete Yield Tables for British Woodlands."

Comparison of Yield from Oats and Scots Pine.—It is a fact worthy of note that the 7 acres of oats yielded in one season a net profit, after deducting £1 per acre for rent, of approximately £7 10s. per acre. The neighbouring area under Scots Pine, even with the present abnormal prices of timber, and even had it been ideally managed, could not, at 4 per cent. interest, yield an equivalent rent of more than about 7s. per acre; that is, about one-twenty-fourth part of the profits obtained under the plough for the year in question.

It is not possible in this note to discuss further the interesting question of farming *v.* forestry, but, after considerable experience and investigation in this matter, the writer is convinced that in England and Wales the greater part of the more or less waste land, upon which a small profit might conceivably be made by afforestation, would yield a much greater profit if properly farmed. Little is known, as yet, of the agricultural capabilities of waste land if properly farmed, but the writer has seen a crop of nearly 8 tons of potatoes per acre lifted upon waste heather land, within 18 months of being broken up, and for which, previously to being broken up, no land agent could have asked a rent of more than 3s. per acre (except as accommodation land near a town). On the other hand, the writer has completed the sale of ideally-grown Scots Pine on similar land within 300 yards, and which, there is ample evidence to prove, never yielded even 1*d.* per acre rent, if calculations are made at 4 per cent. interest.

So, also, in Wales, land has been inspected on which oats, swedes, potatoes and "clover seeds" are grown at nearly 1,300 ft. elevation, and which must certainly yield a far greater profit than will ever be obtained from a well-managed larch plantation adjoining.

Live Stock on the Farm.—There were 11 cows when the farm came under the writer's management. Most of them were inferior, the average milk yield for the previous year being 513 gal. During the year the 4 worst cows were sold, and the remaining 7 cows gave an average of 541 gal. One cow yielded 915 gal. as against 617 gal. the year before. One heifer was brought into the herd.

The profits from pigs were not satisfactory, but better results are anticipated during the current year, as the whole of the pig stock was got rid of last year, and 6 good yelts obtained, 3 of them being pedigree pigs of an excellent strain.

Labour.—The amount paid during the year for manual labour was £239 5*s.* 3*d.* (48*s.* 4*d.* per acre), which is absurdly high, having regard to the work done; no charge, however, has been made for general management.

Capital Employed.—The capital necessary to work the farm was approximately £1,000 (£10 per acre), and the net interest earned for the year was 29 per cent.

THE following Note has been communicated to the Board by Mr. W. W. Glenny:—

The Cultivation of the Leek.

When onions are realising such high prices as at present one is naturally led to consider whether any other member of the *Allium* family, having similar qualities, would make a fair substitute, and impart a like flavour. The onion is used widely in the preparation of soup; and in spring or winter the leek makes a splendid substitute for this purpose, almost unequalled when skilfully used.

In the south of England the leek is not so much appreciated as it is in Scotland, in Wales and in France. It is a fine vegetable where it is thoroughly understood, and when well treated there is nothing of its class that can surpass it in flavour and wholesomeness. The leek is very hardy, and this is probably one reason for its popularity in climates which are liable to severely cold weather.

It seems to have been the only plant of the *Allium* tribe known in England in pre-Saxon times, and it is probably from the fondness of the Celtic tribes for this esculent that their descendants, the Welsh, still retain it as an emblem of their nationality. The *leac*, or *leak*, was also an important table vegetable amongst the Anglo-Saxons, for they called their gardens "leek gardens" (*leac-tun*) and the gardener was a "leekward" (*leac-weard*). As other species of the same tribe were introduced, they were also called leeks with a prefix denoting some peculiarity. Garlic was anciently *gar-leac*, the leek with a spear (*gar*) from the spear-like stem and head of the seed vessel; and an onion was *enne-leac*, or one-leek from its not throwing off side bulbs. Thus it appears that *leac* or *leak* was a general name for a certain kind of herbs.

Large breadths of leeks are grown in France, in the neighbourhood of towns, and on the borders of the river Seine, as they are much valued by the French, who study cookery more than most nations. The writer saw a large plot from the top of the Château at Boulogne, and, asking what it was in the distance, was told "pour la soupe," the guide considering the reply readily understood, so much are leeks used in France to make soup.

There are many varieties of leeks, with varying reputations, and among them may be mentioned the following, viz., the London Flag, Musselburgh, Carentan, Rouen, Emperor, Lyon, Renton's Monarch, Sutton's Favourite, Dobbie's Prize, etc. The Musselburgh and Lyon are those mostly grown in Great Britain. The characteristic of hardiness is most important, as the leek that stands a severe winter is the most reliable. Rouen, Musselburgh and Carentan are worthy of notice, as especially excelling in this respect.

A moist, rich soil suits leek cultivation, and it flourishes in the valley of the Thames or on low-lying ground of marshy character. In market-garden culture it is well to sow a large seed-bed in March and a successional one in April. About 10 lb. of seed would suffice to sow an acre of ground. The price of seed is about 8*s*. to 10*s*. per lb. The seed may be sown broadcast. or may be drilled; in the latter case the rows should be 12 in. apart. As land is cleared of early summer crops, the surplus plants may be transplanted to the vacant ground, leaving in the seed-bed a fair crop about 6 to 8 in. apart from plant to plant. In the Musselburgh district in the Lothians the leeks are never drilled, but are transplanted, or *lined*, to use the local term, from seed-beds on to ground from which spring cabbages or early potatoes have been cleared. Plants remaining in the seed-bed will be ready for market before the transplanted ones, and if they are well cared for by dressing them with 60 bushels of soot or 2 cwt. of nitrate of soda, followed by thorough hoeing, they will make a fair sample. A great quantity may often be bunched off a seed-bed, as the plants stand thickly on the ground, and more leeks may be lifted from a rod of seed-bed than froma transplanted plot of the same area, since in the latter case the leeks are set out at regular distances. A bunch may contain 5, 7 or 9 leeks, according to size, and the bunches are made flat.

Before planting out it is usual to lay the plants evenly together, then with a spade strike off some of the long foliage, as it would never lift up again, and would only be a drag on the plant.

Formerly it was customary to stir the soil among the transplanted crop with a long-handled hoe with an 8-in. blade, but better work is done with a short-handled hoe having a 5-in. blade, as the workman can move the ground closer to the plant and thus give it more air and allow the rain to circulate where it is really needed. Naturally, the latter plan costs rather more, but the work is more efficiently executed, as the operator is nearer his task and moves the soil round the stem of the plant without fear of cutting it off

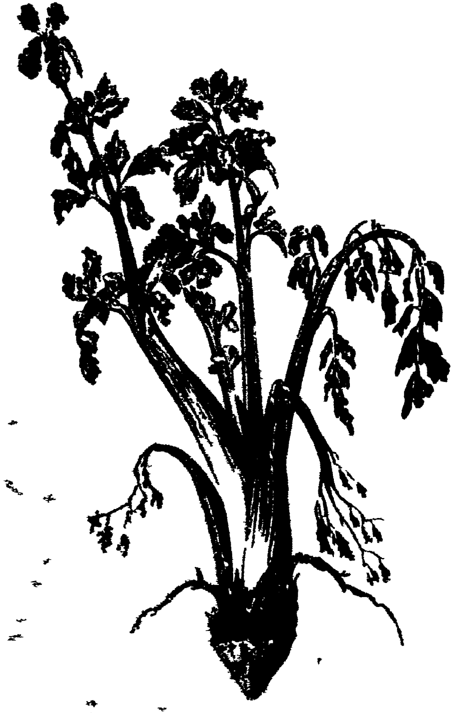
Leeks are generally washed before they are marketed, as then the bleached portion shows up more effectively. For exhibition purposes, leeks are frequently placed in a small trench, and the rows placed wider apart; the soil is then drawn to them, so that a larger part is blanched, and the bunched plants look very attractive. In growing leeks for profit, however, the usual method is to plant on the level, as a larger amount of produce is thus obtained.

Leaf Spot of Celery.

THE "Leaf Spot" or "Blight" of Celery (*Septoria apii*, Chester), a disease which has been greatly on the increase during recent years, is usually overlooked until the plants are mature, when the damage done is often so extensive that serious financial loss results.

Description.—The disease is first recognisable by the presence on the foliage of small, discoloured areas, which increase in size and number until the whole leaf becomes of a dirty greenish-brown colour, and finally rots or withers away (Fig. 1). The outer leaves are first attacked, but the disease rapidly passes to the leaf-stalks and heart-leaves, and the whole plant becomes worthless. If the brown disease areas are carefully examined very minute black points may be seen clustered together (Fig. 2). These serve to distinguish blight from the commoner disease caused by the Celery Fly (see Leaflet No. 35). In the latter case the internal tissues of the leaf are devoured by a leaf-mining maggot, which, if searched for in the early stages of the disease, will be found between the upper and lower surfaces.

Celery blight is caused by a minute fungus known as *Septoria apii*, consisting of very fine thread-like strands invisible to the naked eye. These fine threads, or mycelium, live in the tissues of the leaves, robbing them of their food substance, and finally causing their death. The fungus then begins to reproduce itself by forming myriads of long, narrow spores, so minute that many hundreds, and perhaps thousands, are contained in each of the minute black bodies mentioned above (Fig. 3). In moist weather these spores ooze out from the black spore-case through an apical pore, often in the form of a worm-like or tendril-shaped mass which may be seen with the help of a lens, and they are then washed away or scattered



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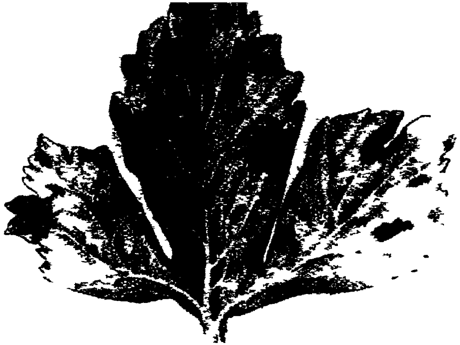

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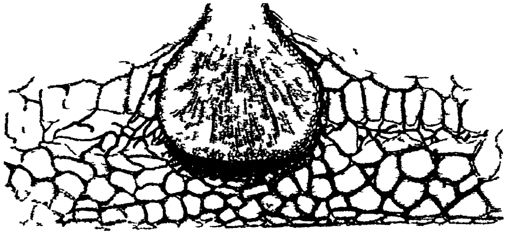

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by rain. When a spore falls on a celery leaf, which afterwards remains damp for a few hours, it germinates, and gives rise to tiny threads which grow into the leaf, and, after about six to nine days, produce a leaf spot. In about another week this spot will have enlarged and turned brown and have developed clusters of black dots, which are the spore-cases of the fungus containing a second crop of spores. Thus in about a fortnight a single spore may give rise to myriads of other spores, each of which is capable of producing myriads more, until the entire field of celery is reeking with the disease.

If diseased celery refuse is left in the field to rot, the soil becomes infected with the fungus spores ; and in the event of celery being again planted the following year the splashing of rain on the soil will carry the spores to the leaves and a diseased crop will almost inevitably result.

A much greater danger than this, however, lies in the use of infected seed. If diseased plants are allowed to go to seed, the fungus attacks the fruits, and, since commercial celery seed really consists of half fruits, it follows that the seed becomes affected and carries with it the germs of the disease. Recent investigations have shown that 90 per cent. of commercial seed samples contained the fungus. Infected seeds give rise to diseased seedlings (Fig. 5), which, if planted out, serve as a centre from which the disease rapidly spreads in all directions.

Methods of Control.—Although so widespread and destructive there is no reason why celery blight should not be eliminated from this country, and the adoption of the following methods of treatment would help very largely to accomplish this :—

1. In purchasing celery seed the dealer should be asked to guarantee in writing that the seed offered for sale has been examined by a competent expert, and has been found to be free from the disease.

2. In order to facilitate this, the Board are themselves prepared to undertake the examination of seed and to furnish a report. Persons who wish to take advantage of this arrangement should forward samples, which should contain not less than 100 seeds, to the Secretary of the Board of Agriculture and Fisheries, Horticulture Branch, Craven House, Northumberland Avenue, London, W.C. ; together with a fee of 1s. for each sample sent. In each case the sender must state the name of the variety of celery, and the source from which such seed has been, or is proposed to be, obtained.

3. If such a guarantee cannot be given, all seed previous to sowing should be steeped for a period of three hours either in

hydrogen peroxide or in a dilute solution of formalin (1 part of commercial formalin in 600 parts of water). . This treatment kills the fungus on the seeds, but does not injure their power of germination, and a crop of healthy seedlings can be obtained.

4. The spores on seed two or three years old are usually dead, and the use of old seed if of good germinating power is, therefore, to be advised.

5. If the disease appears in the crop, steps should at once be taken to eradicate it, but in order to make this possible the blight must be recognised early. Holding a leaf up to the light and looking through it greatly facilitates the recognition of the dark diseased spots in their early stages and the first appearance of the disease on the plants. If only a small number of plants are grown diseased leaves should be picked off at once, and badly-attacked plants dug up and burned. If possible, spraying should also be resorted to.

6. Either Bordeaux or Burgundy mixture should be used for spraying ; at least two and, if the attack is severe, three or four applications at intervals of two or three weeks should be given. (For the preparation of these spraying mixtures see Leaflet No. 23). The spraying should be carried out in dry weather.

7. A top dressing of sulphate of ammonia or other stimulating manure applied at the same time will also be of assistance.

8. All diseased refuse should be burned ; on no account should it be left lying on the land or allowed to reach the manure heap.

9. If sufficient land is available it is very desirable that the rotation should be so arranged that no land bears celery two years in succession.

10. As the spores are only exuded and can only attack the leaves when the latter are damp, conditions favouring dampness, such as poor drainage and close planting, should be avoided.

11. Working amongst the plants whilst they are wet with dew or rain should also be avoided, as the spores of the fungus are liable to be distributed along the rows on the clothes and tools of the worker.

DESCRIPTION OF PLATE.

FIG. 1.—Celery plant, showing a bad attack of Leaf Spot.

FIG. 2.—Part of a Celery leaf, showing diseased areas in which minute specks, or spore-cases of the fungus, containing innumerable spores, may be seen (natural size).

FIG. 3.—Section, through a minute portion of the diseased area, showing the threads (*mycelium*) of the fungus growing between the cells of the leaf, the spore-case, and the long, narrow spores oozing out (much enlarged).

FIG. 4.—Infected Celery fruits, showing the black specks or spore-cases of the fungus (much enlarged).

FIG. 5.—Seedling Celery plant with disease in the two seed-leaves, the result of sowing infected seed (enlarged).

Notes on Feeding Stuffs in April: *From the Animal Nutrition Institute, Cambridge University.*

Advice to Stock Feeders in the Present Crisis.—It is now two years since these notes began, and it seems advisable to mark the anniversary by a few general remarks on the principles which should govern the use of food on the farm during the present crisis.

Food is required by animals for two purposes. In the first place for maintenance, or, in other words, for making good the wear and tear of the working parts of the body and for providing the energy for the vital functions, such as mastica-

TABLE I.

Feeding Stuff.	Digestible Food Units	Approximate Prices per ton at the end of March.					
		London.	Liverpool	Hull.	Bristol.	Glasgow.	Leith.
		£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.
Soya Bean Cake	122·3	—	—	—	—	—	—
Decorticated Cotton Cake ..	126·3	17 7 6	18 5 0	—	18 15 0	19 0 0	18 10 0
Decorticated Cotton Meal ..	126·3	—	—	—	—	—	—
American Linseed Cake ..	119·0	18 2 6	—	—	—	—	—
Indian Linseed Cake	123·1	—	18 17 6	—	—	19 15 0	19 10 0
Russian Linseed Cake ..	123·5	—	—	—	—	—	—
English Linseed Cake ..	120·1	19 10 0	19 10 0	19 0 0	19 15 0	20 10 0	20 5 0
Bombay Cotton Cake ..	65·3	14 15 0	15 5 0	14 15 0	—	—	15 15 0
Egyptian Cotton Cake ..	71·9	15 10 0	15 15 0	15 10 0	15 15 0	16 5 0	16 5 0
Coconut Cake	102·6	16 10 0	—	—	17 0 0	—	—
Palm Kernel Cake	96·1	15 10 0	14 15 0	—	15 0 0	—	‡16 5 0
Palm Kernel Meal (extracted)	92·5	—	—	14 10 0	—	—	—
Ground-nut Cake	145·2	—	—	—	—	18 15 0	—
English Beans	99·5	17 13 8	19 7 4	17 13 8	17 11 7	—	—
Bean Meal	99·5	—	—	—	—	19 10 0	—
Chinese Beans	101·1	Nominal	—	—	—	—	—
English Maple Peas	97·2	20 0 0	—	22 15 6	—	—	—
English Dun Peas	97 2	17 15 7	—	20 0 0	—	—	—
Calcutta White Peas	97·5	Nominal.	—	—	—	—	—
American Maize	93·8	16 6 8	—	17 10 0	—	17 0 0	16 15 0
Argentine Maize	94·2	17 5 4	17 0 8	17 10 0	16 16 0		
Maize Meal	86·5	18 0 0	17 10 0	18 12 6	17 0 0	17 16 0	17 5 0
Maize Gluten Feed	121·6	17 0 0	16 15 0	—	16 10 0	—	—
Maize Germ Meal	99·2	17 10 0	17 5 0	17 0 0	17 0 0	—	—
English Feeding Barley ..	83·0	19 1 8	—	18 15 2	—	—	—
English Oats	75·4	19 3 4	19 10 0	19 6 8	18 0 0	—	19 10 0
Argentine Oats	75·4	19 6 8	18 5 9	—	—		
Malt Culms	69·9	12 10 0	—	11 10 0	11 15 0	13 0 0	13 0 0
Brewers' Grains (dried) ..	84·5	14 10 0	—	14 10 0	14 5 0	14 5 0	14 5 0
Brewers' Grains (wet) ..	21·1	2 8 0	—	2 0 0	—	—	—
Distillers' Grains (English) ..	101·2	14 10 0	14 5 0	—	15 0 0	14 10 0	14 10 0
Distillers' Grains (French) ..	101·2	14 10 0	—	—	—		
Distillers' Grains (fine selected)	101·2	15 10 0	—	—	—	—	—
Distillery Mixed Grains (wet)	20·0	—	—	—	—	—	—
Egyptian Rice Meal	78·7	17 0 0	—	—	—	—	—
Burmese Rice Meal	78·7	16 10 0	—	—	—	—	—
Rice Bran	78·7	—	—	—	—	—	—
Wheat Middlings (coarse) ..	92·0	13 10 0	—	—	—	16 10 0	15 0 0
Wheat Sharps	92·0	13 17 6	14 12 6	14 10 0	14 5 0	14 10 0	14 10 0
Wheat Pollards	87·0	—	14 5 0	—	—	—	—
Wheat Bran	77·5	12 10 0	—	14 10 0	13 5 0	15 0 0	14 10 0
Wheat Bran (broad)	79·9	13 5 0	14 12 6	16 0 0	14 5 0	15 10 0	14 10 0
Feeding Treacle	60·0	15 0 0	18 10 0	—	—	20 0 0	18 15 0
Linseed	153·5	*29 0 0	†30 0 0	—	31 4 6	—	30 10 0
Linseed Oil	250·0	51 10 0	§56 0 0	47 0 0	5s. *per gal.*	—	—
Egyptian Cotton Seed ..	108·6	19 0 0	—	19 5 0	—	—	—
Bombay Cotton Seed ..	99·6	—	—	—	—	—	—
Cotton Seed Oil	250·0	53 0 0	§64 0 0	—	—	—	—
Fish Meal	145·0	—	—	—	—	14 5 0	15 10 0

* Pure crushed. Uncrushed £1 per ton less.

† Cleaned. ‡ Carriage paid. § In barrels.

tion, digestion, breathing, the circulation of the blood, and the necessary movements associated with life. Rough fodder will suffice for this purpose. For instance, grass or hay of poor quality, or even straw, will suffice to maintain stores.

But the owner of live stock is seldom satisfied merely to maintain his animals. He wants them to produce something —growth, fat, milk. or work. For production of this kind rough fodder is not suitable. It is impossible to fatten an animal on poor grass or hay, or on straw, nor will such materials satisfactorily produce growth, milk, or work.

For production, foods of a more easily digestible type are required, such as corn, meal, cake, good grass or hay, or roots.

Foods may, therefore, be divided into coarse or rough fodders, such as poor grass, poor hay, and straw which are suitable only for maintenance, and more digestible foods, such as corn, cake, meal, good grass. good hay, and roots which are suitable for production.

A rough estimate of the total supply of home-grown and imported feeding stuffs available for live stock in the United Kingdom in 1916, works out at between 70 and 80 million tons of dry food, more than half of which is suitable only for maintenance, only about 23 million tons being good enough for production of growth, fat, milk, or work.

The prospective decrease in tonnage due to war needs involves a considerable reduction in the importation of concentrated foods, which, of course include the most valuable productive foods available to stock owners. This decrease will amount to 10 or 15 per cent. of the total of productive foods, but is not likely to exceed 5 per cent. of the total fodder supply of the country.

Apparently, therefore, there is not likely to be any great difficulty in maintaining, or keeping alive, the live stock of the country, but there will certainly be grave difficulty in producing fat meat, milk and work—in fact, it will not be possible to produce all of them.

It is necessary, therefore, to decide which to keep. The work of the country cannot go on without the working horses. The rising generation cannot grow into healthy men and women without milk. A large proportion of the decreased supply of concentrated foods must, therefore, be reserved for working horses and milch cows. This will leave a very small supply for fattening beef, mutton, pork and bacon, and consumers must resign themselves to eating meat of much less appetising quality than they have been accustomed to eat heretofore.

TABLE II.

LONDON. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet)	2	3¼	Maize germ meal	3	6¼
Decorticated cotton cake	2	8¾	English beans	3	6½
Maize gluten feed	2	9½	Malt culms	3	7
Distillers' grains (English)	2	10½	Argentine maize	3	8
Distillers' grains (French)	2	10½	English dun peas	3	8
Wheat middlings (coarse)	2	11	Linseed	3	9½
Wheat sharps	3	0	English maple peas	4	1¼
American linseed cake	3	0½	Linseed oil	4	1½
Distillers' grains (fine			Maize meal	4	2
selected)	3	0¾	Burmese rice meal	4	2¼
Coconut cake	3	2½	Cotton seed oil	4	3
Palm kernel cake	3	2¾	Egyptian cotton cake	4	3½
Wheat bran	3	2¾	Egyptian rice meal	4	4
English linseed cake	3	3	Bombay cotton cake	4	6
Wheat bran (broad)	3	3¾	English feeding barley	4	7
Brewers' grains (dried)	3	5¼	Feeding treacle	5	0
American maize	3	5¾	English oats	5	1
Egyptian cotton seed	3	6	Argentine oats	5	1¼

TABLE III.

LIVERPOOL. PRICES PER FOOD UNIT.

	s	d.		s.	d.
Maize gluten feed	2	9	English beans	3	10½
Distillers' grains (English)	2	9¾	Linseed	3	11
Decorticated cotton cake	2	10½	Maize meal	4	0½
Indian linseed cake	3	0¾	Egyptian cotton cake	4	4½
Palm kernel cake	3	0¾	Linseed oil	4	6
Wheat sharps	3	2	Bombay cotton cake	4	8
English linseed cake	3	3	Argentine oats	4	10
Wheat pollards	3	3¼	Cotton seed oil	5	1½
Maize germ meal	3	5¾	English oats	5	2
Argentine maize	3	7¼	Feeding treacle	6	2
Wheat bran (broad)	3	8			

TABLE IV.

HULL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet)	1	10¾	Wheat bran	3	9
Wheat sharps	3	1¾	Linseed oil	3	9
Palm kernel meal	3	1¾	Wheat bran (broad)	4	0
English linseed cake	3	2	English dun peas	4	1½
Malt culms	3	3½	Egyptian cotton cake	4	3½
Maize germ meal	3	5¼	Maize meal	4	3½
Brewers' grains (dried)	3	5¼	Bombay cotton cake	4	6
English beans	3	6	English feeding barley	4	6¼
Egyptian cotton seed	3	6	English maple peas	4	8¼
Argentine maize	3	8½	English oats	5	1¼
American maize	3	8¾			

TABLE V.

BRISTOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Maize gluten feed ..	2	8½	Wheat bran	3	5
Decorticated cotton cake	2	11½	Maize germ meal ..	3	5¼
Distillers' grains (English)	2	11¾	English beans	3	6¾
Wheat sharps	3	1	Argentine maize.. ..	3	6¾
Palm kernel cake ..	3	1½	Wheat bran (broad) ..	3	7
English linseed cake ..	3	3¼	Maize meal	3	11¼
Coconut cake	3	3½	Linseed	4	1
Malt culms	3	4	Egyptian cotton cake ..	4	4¾
Brewers' grains (dried)..	3	4½	English oats	4	9¾

TABLE VI.

AVERAGE PRICES PER FOOD UNIT.

LONDON, LIVERPOOL, HULL AND BRISTOL.

	s.	d.		s.	d.
Brewers' grains (wet) ..	2	1	Egyptian cotton seed ..	3	6¼
Maize gluten feed ..	2	9	American maize ..	3	7¼
Decorticated cotton meal	2	10¼	Wheat bran (broad) ..	3	7½
Distillers' grains (French)	2	10½	Argentine maize.. ..	3	7¾
Distillers' grains (English)	2	10¾	English beans	3	7¾
Wheat middlings ..	2	11	English dun peas ..	3	10¾
American linseed cake ..	3	0½	Linseed	3	11
Indian linseed cake ..	3	0¾	Maize meal	4	1¼
Distillers' grains (fine selected)	3	0¾	Linseed oil	4	1¾
			Burmese rice meal ..	4	2¾
Wheat sharps	3	1	Egyptian cotton cake ..	4	4
Palm kernel cake ..	3	1½	Egyptian rice meal ..	4	4
Palm kernel meal ..	3	1¾	English maple peas ..	4	4
English linseed cake ..	3	2¾	Bombay cotton cake ..	4	6
Coconut cake	3	3	English feeding barley ..	4	6
Wheat pollards	3	3½	Cotton seed oil	4	8¼
Malt culms	3	5	Argentine oats	4	11
Brewers' grains (dried) ..	3	5	English oats	5	0
Maize germ meal ..	3	5½	Feeding treacle	5	7
Wheat bran	3	5½			

TABLE VII.

GLASGOW. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	1	11½	Wheat middlings ..	3	7
Ground nut cake ..	2	7	Maize	3	7½
Distillery mixed grains (dried)	2	10½	Malt culms	3	8½
			Wheat bran	3	10½
Decorticated cotton cake	3	0	Wheat bran (broad) ..	3	10½
Indian linseed cake ..	3	2½	Bean meal	3	11
Wheat sharps	3	2	Maize meal	4	1½
Brewers' grains (dried)	3	4½	Egyptian cotton cake ..	4	6¼
English linseed cake ..	3	5	Feeding treacle	6	8¼

TABLE VIII.

LEITH. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	1¾	Maize	3	6¾
Distillery mixed grains (dried)	2	10½	Wheat bran (broad)	3	7½
			Malt culms	3	8¾
Decorticated cotton cake	2	11	Wheat bran	3	9
Indian linseed cake	3	2	Linseed	4	0
Wheat sharps	3	2	Maize meal	4	0
Wheat middlings	3	3	Egyptian cotton cake	4	6¼
English linseed cake	3	4½	Bombay cotton cake	4	9¾
Palm kernel cake	3	4½	Oats	5	2¼
Brewers' grains (dried)	3	4½	Feeding treacle	6	3

TABLE IX.

AVERAGE PRICES PER FOOD UNIT.

GLASGOW AND LEITH.

	s.	d.		s.	d.
Fish meal	2	0½	Maize	3	7
Ground nut cake	2	7	Malt culms	3	8¾
Distillery mixed grains (dried)	2	10½	Wheat bran (broad)	3	9
			Wheat bran	3	9¾
Decorticated cotton cake	2	11½	Bean meal	3	11
Wheat sharps	3	2	Linseed	4	0
Indian linseed cake	3	2¼	Maize meal	4	0¾
Palm kernel cake	3	4½	Egyptian cotton cake	4	6¼
Brewers' grains (dried)	3	4½	Bombay cotton cake	4	9¾
English linseed cake	3	4¾	Oats	5	2¼
Wheat midd'ings	3	5	Feeding treacle	6	5½

It is not generally realised that by far the most abundant supply of productive food has hitherto been obtained from the produce of good grass land. A rough estimate indicates that of the 23 million tons of productive food available during the year about half consists of good grass-land produce. This, of course, the submarines cannot decrease, and it behoves every occupier of such land to make the very most of it, so as to produce from it the maximum of human food and save the cake, corn and meal for next winter. In the present circumstances it is wasteful to use any kind of concentrated food for animals on grass, if it can by any possibility be avoided. This is not the time to use cake for improving grass land, for greater improvement could be more quickly obtained by judicious use of home-produced manures.

Prices.—Changes in price since last month have been very irregular. Wheat offals generally have become cheaper, and maize dearer, probably because increasing proportions of maize are being used in the preparation of flour. Other feeding stuffs remain at about the same price as last month.

It should be mentioned that the figures for the digestible nutrients and food units in wheat offals have been altered since last month in accordance with a number of analyses reently made, which can be seen in a paper on the subject in the last issue of this *Journal* (p. 1179).

Horses.—Since last month oats have become slightly dearer, and maize very much so, but wheat offals are considerably cheaper. Last month's ration may therefore be altered as follows :--

3 lb. Dried grains.
5 „ Wheat pollards,
or 6 „ Bran.
1 lb. Gluten feed.
1 „ Linseed cake.

This should be used to replace 12 lb. of oats until the horses are turned out to grass. As compared with oats, this ration is rather deficient in starchy materials, which should be made up by an allowance of 10 or 12 lb. of roots per head per day.

For horses at work in towns a mixture of dried grains, gluten feed, sharps or pollards and oats in equal proportions may be used to replace oats weight for weight.

Milking Cows should still get the ration given last month—2 lb. of decorticated cotton cake and 3 lb. gluten feed—until they go out to grass, when they should require no concentrated food, except perhaps 2 lb. of cotton cake for a short time to prevent scouring.

Cattle Fattening for Beef.—The stall-feeding season is now coming to a close. Those who are finishing their last lots of cattle should refrain from excessive use of cake and corn. Under present conditions the use of more than 3 or 4 lb. per head, even for finishing, can only be regarded as wasteful from the national point of view. During the last month or six weeks before a bullock reaches the stage known as "prime fat," for every pound of fat put on he consumes about 15 lb. of dry food, of which about 4 lb. is cake or corn. By selling for slaughter a month or six weeks before prime condition is reached the final and most wasteful stage is avoided, and considerable saving of feeding stuffs is effected. The farmer may still derive some profit from "finishing" beasts which have reached this stage, because butchers are still willing to give excessive prices for "prime" beef, but it is a practice wasteful of the national resources, and the patriotic farmer will not be a party to it.

Sheep Fattening on roots, etc., should be treated in the same way for similar reasons.

Ewes with Lambs should get the smallest possible allowance of concentrated food. One of the mixtures recommended last month will still be found economical.

Young Stock should go out to grass at the earliest possible opportunity, and should not get concentrated food except in very special cases.

Pigs.—It will be necessary to reduce the number of pigs because the supply of meal on which most pig keepers are

TABLE X.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Per cent. digestible.				
Name of Feeding Stuff.	Nutritive Ratio.	Protein.	Fat.	Carbo-hydrates and Fibre.	Starch equiv. per 100 lb.	Linseed Cake equiv. per 100 lb.
Foods rich in both Protein and Oil or Fat.						
Ground nut cake	1 : 0·8	45·2	6·3	21·1	77·5	102
Soya bean cake	1 : 1·1	34·0	6·5	21·0	66·7	88
Decort cotton cake ..	1 : 1·2	34·0	8·5	20·0	71·0	93
Linseed cake, Indian ..	1 : 1·9	27·8	9·3	30·1	77·1	101
Linseed cake, English ..	1 . 2·0	26·7	9·3	30·1	76·0	100
Cotton cake, Egyptian ..	1 : 2·1	15·5	5·3	20·0	40·0	53
Cotton cake, Bombay ..	1 : 2·5	13·1	4·4	21·5	37·6	49
Distillers' grains (English) ..	1 2·9	18·7	10·2	29·0	57·3	75
Distillers' grains (French) ..						
Maize gluten feed	1 : 3·0	20·4	8·8	48·4	87·4	115
Brewers' grains, dried ..	1 : 3·5	14·1	6·6	32·7	50·3	66
Coconut cake .. .	1 : 3·8	16·3	8·2	41·4	76·5	101
Palm kernel cake	1 : 4·5	14·1	6·1	48·9	76·7	101
Linseed	1 : 5·9	18·1	34·7	20·1	119·2	157
Bombay cotton seed ..	1 : 6·6	11·0	16·8	30·1	77·5	102
Fairly rich in Protein, Rich in Oil.						
Maize germ meal	1 . 8·5	9·0	6·2	61·2	81·0	107
Rice meal	1 . 9·4	6·8	10·2	38·2	68·4	90
Rich in Protein Poor in Oil.						
Fish meal	1 : 0·1	54·0	4·0	—	60·0	78
Peas, Calcutta white ..	1 : 2·1	23·3	1·1	45·9	66·9	88
Beans, English	1 : 2·6	19·3	1·2	48·2	67·0	88
Beans, Chinese	1 : 2·6	19·6	1·7	47·9	67·0	88
Peas, English maple ..	1 . 3·1	17·0	1·0	50·0	70·0	92
Palm-nut meal (extracted)	1 : 3·4	15·6	1·9	48·7	66·1	87
Brewers' grains, wet ..	1 : 3·5	3·5	1·5	8·6	12·7	17
Malt culms	1 : 3·6	11·4	1·1	38·6	38·7	51
Cereals, Rich in Starch, not Rich in Protein or Oil.						
Barley, feeding	1 : 8·0	8·0	2·1	57·8	67·9	89
Oats, English	1 . 8·0	7·2	4·0	47·4	59·7	79
Oats, Argentine	1 : 8·0	7·2	4·0	47·4	59·7	79
Maize, American	1 : 11·5	6·7	4·5	65·8	81·0	107
Maize, Argentine	1 : 11·3	6·8	4·5	65·8	83·5	110
Maize meal	1 : 13·0	5·5	3·5	63·9	77·8	102
Wheat middlings, fine ..	1 · 4·8	13·2	3·0	53·8	72·0	95
Wheat middlings, coarse or sharps	1 : 5·1	13·8	4·3	50·5	64·0	84
Wheat pollards	1 : 4·5	11·6	4·0	51·6	60·0	79
Wheat bran	1 : 4·7	11·3	3·0	45·0	49·7	65
Wheat bran, broad	1 4·7	11·3	3·0	45·4	48·1	63
Locust bean meal	1 : 22·1	4·0	0·7	69·2	71·4	94

accustomed to feed them is not available. A considerable amount of pork and bacon can, however, be produced by adopting the methods suggested in "Notes" for February and March, which may be summarised as follows :—Wean on the finer wheat offals. Run on grass or other green stuff, with a small allowance of palm kernel cake, coconut cake, beans or peas, until ready to fatten. Fatten on finer wheat offals. By this method pork or bacon can be produced with half the usual consumption of concentrated food.

Notes on Poultry Feeding:
From the Harper Adams Agricultural College

THE prices for poultry foods during the past three months have steadied, but locally there has been a greater difficulty in obtaining supplies, and several foodstuffs have in some places been absolutely unobtainable. The proximity to markets, and the possibility of obtaining supplies have, therefore, to be the ruling factors, rather than the price paid for the particular food. Some foodstuffs have, on the contrary, been more readily obtainable, and at reduced prices, compared with those quoted on 1st January last. Fish meal, which at that time was almost unobtainable, has been offered more freely at a reduced price. The prices of the principal feeding stuffs are given on p. 71. In the case of certain other feeding stuffs specially useful for poultry the prices early in April were about as follows :—

Biscuit dust, 15*s* per cwt.; fish meal, 17*s*. 6*d*. per cwt.; rice meal, 20*s*. per cwt.; and cracked maize, 18*s*. per cwt.

The scarcity of green food, owing to serious damage throughout the country by the repeated frosts and the exceptional spells of cold, dry east wind, has told particularly upon the poultry food ration. Swedes and mangolds have been increasing in price, and the former are now getting short, but mangolds may well be used cut in quarters and given so that full use is made of them without waste.

Household waste and scraps are generally available and should be used to help out the purchased meals and other concentrated foods.

Wheat is a prohibited grain for poultry food, and it is desirable that other grains suitable for human food should not be used for poultry, so that substitutes should be provided, *e.g.*, tailings, screenings, and damaged grain, though even these are being used for other stock. Damaged barley and oats may be used with cracked maize without any detrimental effect. A trial with barley, oats and maize mixture gave satisfactory results during February and March in the case of four pens of birds, which produced in the two months :—

10 White Wyandottes ..	397 eggs.	
10 " " ..	330 "	(two birds broody).
10 White Leghorns ..	312 "	
10 Buff Orpingtons ..	289 "	(three birds broody).

The ration given to the birds was made up as follows :—

Sharps,	12 parts.	Oats,	12 parts.
Bran,	2 "	Barley,	6 "
Fish Meal,	2 "	Maize,	6 "

The bran and fish meal were scalded and dried off with sharps, and this soft food was given in the morning, the mixed grain being given at the mid-day and afternoon feeds. Green food and mangolds were given when available.

The price of eggs, although considerably below that ruling when the last notes were published in January, is still high enough to warrant a full ration, and economy should be practised in directions other than in reducing the food bill until weather conditions allow more outside food to be obtained.

In view of the difficulty of obtaining the various foodstuffs in different localities, the following variations are given for the soft food ration, the hard or grain portion in each case being made up as follows :—

Grain ration, about 2 oz. per bird per day : damaged oats, 2 parts ; cracked maize, 1 part ; and barley or dari, 1 part.

Soft food, amounting to about 2 oz. per bird per day :—

1st.—		2nd.—	
Palm Kernel Meal ..	1 part.	Coconut Cake Meal	1 part.
Rice Meal	1 "	Rice Meal	1 "
Sharps	1 "	Sharps	1 "
Bran	1 "	Clover Meal	1 "
Fish Meal	1 "	Meat Meal	1 "
3rd.—		**4th.—**	
Brewers' Grains ..	1 "	Biscuit Dust ..	1 "
Sharps	1 "	Sharps	2 parts
Rice Meal	1 "	Clover Meal ..	1 part.
Clover Meal ..	1 "	Fish Meal	1 "
Fish Meal	1 "	Malt Dust	1 "

Where the foods will allow the foregoing mixtures may be interchanged with advantage, as the birds will respond to a change in their diet, providing sudden changes are avoided.

Notes on Manures in April:
From the Rothamsted Experimental Station.

Potash Fertilisers.—A considerable quantity of wood ashes is being produced by the Forestry Corps in their work in woodlands and forests. The ashes contain on an average about as much potash as kainit; whenever the material can be obtained it should be taken at once. It should be carefully stored in a dry place, not exposed to rain, as the potash is in a highly soluble combination that readily washes out.

Army stable manure and seaweed both contain quantities of potash and should be used whenever they can be obtained.

Reference may be made to an article in this *Journal* in November, 1914, where it is shown that the ashes of hedge trimmings, etc., contain about 10 per cent. of potash (K_2O), equal to nearly 20 per cent. of sulphate of potash and worth a good deal at present prices. In the fields there described the cleaning out of the hedge bottoms yielded about 5 lb., and the hedge trimmings yielded about 10 to 20 lb., of ash per 100 yd. of hedge. On this basis a 20-acre field with 1,300 yd. of hedge would give potash altogether equivalent to nearly 2 cwt. of kainit. The ash, however, must be collected at once and not exposed to rain.

In some cases it is not necessary to use potash at all, as a dressing of salt will give the required effect. This is particularly true of the mangold crop. Thus, at Woburn, the following results were obtained:—

Mangolds, Warren Field, 1908.
Produce of Roots. Tons per acre.

Nitrate of Soda	None	1 cwt.	1 cwt.	1 cwt.	1 cwt.	1 cwt.
Salt	,,	None	1 ,,	2 ,,	4 ,,	6 ,,
Sugar Mangolds..	28·0	30·2	31·3	34·4	34·7	33·9
Golden Tankard	19·9	23·4	23·9	29·4	28·9	33·5
Yellow Globe ..	28·2	33·2	34·9	38·0	38·3	41·2
Long Red ..	31·8	26·6	32·3	35·2	36·6	36·6
Mean of four varieties	27·0	30·9	30·6	34·3	34·6	36·3

At the Harper-Adams College the results of trials with mangolds in the three seasons 1913-15 were:—

No salt.		*5 cwt. salt after sowing.*		*10 cwt. salt after sowing.*
27½	....	35¼	..	36 tons per acre.

Not only did the salt increase the crop, as shown above, but it did this without depressing the dry matter or the sugar content of the crop.

In Northumberland, Gilchrist found that an application of 2 cwt. of salt per acre was beneficial, increasing the yield of mangolds by some 4 tons per acre. Milburn and Gaut, in Lancashire, obtained good results from 1 cwt. of salt.

The Central European investigators for some time prior to the War studied the effect of salt on sugar beets to see if the composition of the crop would be adversely affected, and found that it was not. The Austrian investigators, Strohmer, Briem, and Fallada, obtained increases both in yield and sugar content when sugar beet was manured with salt. So also Andreik and Urban, and also Mette, all in Bohemia, found that salt increased the yield without lowering the sugar content; in one experiment the percentage of sugar in the control crops was 20·6, while in the crops treated with salt it was 21 5.

These results may reasonably be taken as confirming those of the British investigators already quoted.

Unfortunately we have no such clear evidence in the case of the potato crop. It is possible that salt would increase the yield, especially where potash is known to be necessary, but there is the possibility that some damage might be done to the quality of the crop. Only a few experiments have been made, and those unfortunately not in this country. Pagnoul, many years ago, found that sodium does not actually get into the tuber, so that no direct injury from this source need be anticipated, but the possibility of indirect effects still remains. Hartwell and Wessels, in the Rhode Island experiments, found that potatoes manured with sodium instead of potassium were less mealy when cooked, and also contained less ash and more nitrogen. Whether the effects would be of any material significance is uncertain. The fact that many growers use kainit for potatoes suggests that salt could be used without likelihood of harm.

On grass land known to respond to kainit dressings of salt may be expected to give good results.

Top Dressings for Hay Land.—In view of possible restrictions in feeding stuffs it becomes highly desirable to obtain as much hay as possible, and for this purpose suitable manurial dressings should be given where possible. Owing to difficulties connected with supplies it is not possible to suggest schemes of universal application. The following are the facts showing the action of fertilisers on hay crops. The yield of hay on ordinary meadow land may often be largely increased by the use of a nitrogenous fertiliser. The most suitable nitrogenous manures for producing bulk of herbage are nitrate of soda, sulphate of ammonia, and the new fertilisers—nitrolim and nitrate of lime. Many farmers have obtained hay for a number of years simply by applying ¾ to 1½ cwt. of nitrate of soda per acre and nothing else to the land. Sulphate of ammonia also serves for a time, though not so well.

Although this scheme may answer in a particular year, it cannot be recommended permanently because it causes serious deterioration of the herbage. At Rothamsted one of the plots has long received 2½ cwt. of nitrate of soda per acre each year; an average yield of 34 cwt. of hay has been maintained, but there has been a marked falling off in the quality; the clover has decreased, and the weeds have increased so much that they now make up more than 30 per cent. of the whole.

Sulphate of ammonia used by itself produces equally undesirable results. On the average the yield at Rothamsted is practically the same as with nitrate of soda—36 cwt. per acre—though it has not kept up so well in recent years; the clover has entirely disappeared, and the grass is mainly sheep's fescue.

When nitrate alone is used the falling off in quality shows itself in the great variety of herbage and the number of flowers—ox-eyed daisies, scabious, bird's-foot trefoil, hawkbit, and many others appearing along with the delicate-looking quaking-grass.

The cause of this deterioration lies in the fact that neither nitrate of soda nor sulphate of ammonia furnished a complete food for the plant; phosphates are needed also, and on some soils, usually the lighter ones, potash salts as well.

When a complete dressing of artificials is used instead of nitrate of soda, or ammonia salts alone, a higher yield of considerably better quality is obtained; the average results at Rothamsted are:—

		Yield of Hay: Cwt. per acre. Average of 57 years.	*Percentage Composition of Hay Samples Taken during 1856–1912.*		
	Plot.	*1856–1912.*	*Grasses.*	*Clovers (Leguminosæ).*	*Others (Weeds, etc.)*
Nitrate of soda + phosphates and potash, etc. ..	16	46·3	82·9	5·4	11·7
Nitrate of soda alone	17	33·7	71·0	1·3	27·7

The clovers, etc., do better, and so do the grasses, consequently the weeds become crowded out to a greater extent.

This is further demonstrated in the Cambridge experiments at the University Farm for the seasons 1901 and 1902, when the following results were obtained :—

	Cwt. Hay per acre. 1901.		*Cwt. Hay per acre.* 1902.		*Increase in 2 years over unmanured.*
Unmanured	22½	..	26¼	..	—
Sulphate of ammonia alone, 2½ cwt. per acre	32½	..	48	..	34½
Sulphate of ammonia + 10 cwt. of basic slag	46½	..	63¾	..	64¼
Slag alone	32	..	43	..	29

The fact that a complete artificial manure is well suited to grass land laid in for hay is shown by the fact that the hay steadily improves as time goes on. Thus at Rothamsted in 1914, a dry year, very unfavourable for hay, the results were :—

	Plot.		*Yield : Cwt. of Hay per acre.*		*Percentage Composition of Hay.* *Grasses.*		*Clovers (Leguminosæ).*		*Others (Weeds, etc.)*
Nitrate of soda + phosphates and potash, etc. ..	16	..	37·5	..	74·4	..	15·6	..	8·3
Nitrate of soda alone	17	..	23·3	..	68·4	..	0·6	..	30·2

· Another instance is furnished by the Garforth experiments over the 12-year period, 1899–1910. A complete mixture of artificials applied every year gave the highest percentage of good grass, and the lowest percentage of weeds. Cocksfoot and Golden Oat were strongly encouraged, while Bent and Sorrel were greatly reduced. The omission of potash only slightly brought down the yield, but affected the quality of the herbage to a greater extent, reducing the proportion of grass, and increasing that of weeds, especially of Sorrel :—

					Composition of Herbage.						
	Plot.		*Yield of Hay : Cwt. per acre.*		*Grasses.* *Good.*		*Grasses.* *Inferior.*		*Leguminosæ.*		*Others (Weeds, etc.).*
Unmanured ..	1	..	29½	..	17·8	..	59·1	..	Nil.	..	18·3
10 tons dung annually ..	2	..	52½	..	43·3	—	14·3	..	Nil.	..	36·8
Complete artificials* ..	7	..	42¾	..	69·6	..	15·5	..	0·3	..	10·8
Nitrate and superphosphates only	9	..	40½	..	56·6	..	12·7	..	Nil.	..	24·5

* 1½ cwt. nitrate of soda, 2 cwt. superphosphate, 3 cwt. kainit per acre.

Dung encouraged the good grasses, especially Foxtail and Cocksfoot, and repressed Bent, but it also encouraged Soft Brome—a poor grass—and very considerably increased the proportion of weeds.

The Cockle Park experiments led to the same results. Nitrogenous manures increased the crop, but caused deterioration in the herbage. When basic slag was supplied in addition there was a larger and much more profitable crop. None of the manures tested, however, were as effective as the combination of dungs and artificials,* or as profitable as dung. Thus on the Palace Leas Field the average yields of hay in cwt. per acre for the 18 years 1897 to 1914, and the live-weight gains per week in sheep fed on equal weights of hay during the period November, 1905, to January, 1906, were :—

——	Un-manured Plot 6.	Sulphate of Ammonia alone. Plot 7.	Sulphate of Ammonia and Slag. Plot 10.	Slag and Potash. Plot 12.	Dung (8 tons) and Artificials (2¼ cwt.) Plot 1.	Dung (8 tons) alone. Plot 2.
Yield of hay, cwt. per acre ..	19¼	34	31	26¼	42	39
Live weight gains in sheep, lb. per week ..	1 78	—	—	2 26	1 65	2 04
		s. *d*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Average annual gain or loss over unmanured ..	—	5 6*	5 5	2 11	0 1	9 5
Average annual gain or loss over unmanured when quality is taken into account	—	11 7	9 3	19 11	8 5	23 0

* Loss of 5*s.* 6*d.*

When the complete manure is used it is safe to increase the dressing of nitrate of soda or sulphate of ammonia, and as a general rule the more nitrogenous manure is used the bigger the crop. Whether the increase is profitable depends of course on prices. There is some deterioration in quality; the tall-growing grasses flourishing so much that they crowd out the weeds. Thus at Rothamsted the results were :—

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* The dressings were 150 lb. sulphate of ammonia, 300 lb. slag (or, in some of the earlier years, 400 lb. super.), 100 lb. muriate of potash per acre.

	Yield of Hay: Cwt. per acre. Average. 57 years.	*Percentage Composition of Hay.*		
		Grasses.	*Clovers, etc. (Leguminosæ).*	*Other (Weeds, etc.)*
Nitrate of soda + phosphates and potash ..	46·3	82·9	5·4	11·7
Double dose of nitrate of soda + phosphates and potash, etc. ..	56·9	88·8	3·7	7·5
Equivalent dressings of sulphate of ammonia + phosphates and potash, etc.	54·3	91·2	1·3	7·5

Similar results were obtained in the Yorkshire experiments :—

Manurial Dressings per acre.	*Average Yield of Hay, 1899 and 1900: Cwt. per acre.*
Unmanured	21·5
2 cwt. superphosphate, 3 cwt. kainit, and no nitrate of soda	25·5
2 cwt. superphosphate, 3 cwt. kainit, 1 cwt. nitrate of soda	32·5
2 cwt. superphosphate, 3 cwt. kainit, 1½ cwt. nitrate of soda	35·0
2 cwt. superphosphate, 3 cwt. kainit, 2 cwt. nitrate of soda..	37·8

The Lancashire experiments also gave similar results. When the amounts of kainit and of superphosphate were increased, however, there were no such increases in the yield of hay. It makes very little difference to the yield whether sulphate of ammonia or nitrate of soda is used, but such advantage as there is lies in favour of the nitrate of soda.

Where the seeds hay has suffered badly owing to inclement weather it may be desirable to plough it up and put the land into roots rather than have it full of weeds. The shortage of hay would then have to be made good by manuring the meadow land on the lines above indicated.

Unit Prices of Artificial Manures in April.—The statement on p. 86 shows the cost to the purchaser of 1 per cent. per ton of nitrogen, and soluble and insoluble phosphates derived from various sources, at certain ports and manufacturing centres, for April, 1917.

NOTE.—These unit prices are based on the *probable* retail cash prices in bags f.o.r. for quantities of not less than 2 tons of the manures mentioned at the ports and places specified, but it should be borne in mind that market prices are fluctuating considerably at the present

UNIT PRICES OF ARTIFICIAL MANURES.

—	England and Wales.										Scotland.	
	London.	King's Lynn	Hull.	Newcastle.	Silloth.	Liverpool.	Widnes.	Newport.	Bristol.	Plymouth	Glasgow.	Leith.
Nitrogen from :	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Sulphate of Ammonia pure .. 95 %	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 6	15 6
93 %	—	—	—	—	—	—	—	—	—	—	—	—
Calcium Cyanamide (Nitrolim)	20 0	—	—	—	—	—	—	—	—	20 0	—	—
Nitrate of Soda pure .. 95 %	—	—	28 2½	—	—	29 10	30 6	—	28 4½	27 1	—	29 4¼
90 %	29 4	33 4	34 0	—	—	—	—	—	29 4	29 4	—	—
Nitrate of Lime ..	—	—	—	—	—	—	—	—	—	—	—	—
Castor Meal	—	—	24 9	—	—	—	—	—	—	—	—	—
Allowed for Insol. Phos.	—	—	*2 0*	—	—	—	—	—	—	—	—	—
Allowed for Potash ..	—	—	*15 0*	—	—	—	—	—	—	—	—	—
Soluble Phosphates from :												
Superphosphate 35 %	3 8½	3 1½	3 6	4 0	4 0	4 2½	4 1½	3 5	—	—	—	—
,, 33 %	—	3 2	3 5	—	—	4 3	4 2	3 5	—	—	—	—
,, 30 %	4 0½	3 4½	3 6	3 10	4 1	4 4	4 3	3 5	3 5	3 5	—	4 2
,, 26 %	4 2½	3 8	3 10	4 3	4 5	4 8½	4 6½	3 9	—	3 9	—	—
Dissolved Bones ..	5 7	5 5½	5 2	5 5½	5 2½	5 3½	—	5 9	5 10	5 7	—	—
Allowed for Nitrogen..	*20 11*	*20 3½*	*19 2½*	*20 3½*	*19 4½*	*19 10½*	—	*21 4½*	*21 8*	*20 11*	—	—
Allowed for Insol. Phos.	*3 4*	*3 2½*	*3 0*	*3 2½*	*3 0½*	*3 1*	—	*3 4½*	*3 5*	*3 3½*	—	—
Insoluble Phosphates (Citric Soluble) from:												
Basic Slag	2 9	2 7½	2 10½	—	—	—	—	—	2 5½	3 7½	3 3½	3 3½
Insoluble Phosphates from :												
Basic Slag	—	2 8½	2 3½	2 0	—	—	1 11	—	2 9	2 9½	—	—
Bone Meal	3 0	3 3	3 0	—	2 10	3 1½	3 2	2 11½	3 1½	3 2½	—	—
Allowed for Nitrogen..	*19 1*	20 9½	*18 11*	—	*18 1½*	*19 9½*	*20 1½*	*18 9½*	*20 0*	*20 5½*	—	—
Steamed Bone Flour..	2 6½	3 0	2 11½	—	—	—	—	2 4½	2 7½	2 9	—	—
Allowed for Nitrogen..	*16 4*	*18 11½*	*18 9½*	—	—	—	—	*15 2½*	*16 7½*	*17 6½*	—	—
Fish Guano	—	3 8½	3 1	—	3 7	3 2½	—	—	—	—	—	—
Allowed for Nitrogen..	—	*23 8*	*19 8½*	—	*22 10½*	*20 3½*	—	—	—	—	—	—
Potash					No quotations.							

time. The prices are published by the Board of Agriculture and Fisheries for use in comparing the commercial values of artificial manures. They may also be used as a guide to the probable price per ton of any of the manures mentioned if the unit prices of the constituents of the manure are multiplied by the percentages of the constituents found in it, and due allowance is made for the difference between cash prices and credit prices, and for cost of carriage from the nearest centre to the place where it is delivered to the purchaser. If used in connection with the valuation of a compound manure regard must be had to the sources of the constituents, and a reasonable sum must be added for mixing, disintegrating, and rebagging the ingredients, bags, and loss of weight.

Economy in the Use of Seeds.

IT is important in the national interest that everyone who is sowing vegetable seeds should exercise economy in order that no more seed should be sown than is necessary. In ordinary times, when seed is both plentiful and cheap, it is often used with a free hand, but at the present time the seeds of many vegetables are neither plentiful nor cheap, and it is, therefore, not only a wise economy but also a duty to make seed go as far as possible.

The following hints will be of use in this connection :—

1. The seeds of many vegetables, especially if they are from a good harvest, retain their germinating power almost unimpaired for several years. This is true, for example, in the case of seeds of leguminous food plants—peas, beans, scarlet runners, French beans, etc. Therefore, before opening this year's seed packets, seeds of these kinds of vegetables left over from last year's seed order should be tested in order to ascertain whether they will germinate well or not. This is very easily done. All that is necessary is to line two saucers with pieces of flannel or with blotting paper and to moisten, but not thoroughly to wet, the flannel or blotting paper. A known number of seeds (20 or 30) should be placed, well separated from one another, in one of the saucers. The other saucer is then inverted on the one containing the seeds, and the saucers are stood in a moderately warm place, and to prevent drying up by evaporation, may be covered with a bowl, jar or newspapers. The germination will be quicker if before the seeds are placed in the saucer they are soaked in water until they have " plumped up "—for example, they may be soaked over night. After a day or two, the saucers being examined

daily, the seeds which have begun to sprout are counted and removed. The rate of each seed's germinating varies very much according to the kind, so that the test must run on for a time, varying from two or three days to ten days or a fortnight. If a fair proportion of last year's seeds germinate they should be sown, and this year's seeds may be kept in their unopened packets for use next year.

2. Seeds should be sown as thinly as possible, but at the same time, it must be remembered that, if sown too thinly, there may be gaps when the seedlings come up.

3. It should be remembered that many seedlings transplant quite well, so that carefully lifted thinnings can be used to increase the number of rows.

4. Care should be taken to ensure that there is no wasteful use of such seeds as those of cauliflower, as the supply will probably be short next year. At the same time, large gardeners should remember that a few dozen seedlings (good varieties) of cabbages and savoys are often a welcome gift to the smaller gardeners in their neighbourhood.

5. In ordinary years the seeds of scarlet runners, broad beans, and peas, ripen perfectly well in this country, and growers may well save a fair amount of seed from their own crop. Anyone who has parsnips, beet, carrots, leeks, celeriac or cabbages sown last year should leave some of each of these, plants in the ground, let them run to seed, and, if they do, seed should be saved. Home-saved seed should, if possible, be protected from birds, and should be allowed to ripen thoroughly, should be harvested when ripe, and all the bad seed picked out and burnt, and the rest kept away from the air in a cool, dry place. The risk of disappointment in some cases owing to a wet autumn is well worth taking.

6. Another point which amateurs would do well to remember is that mice are very fond of certain kinds of seeds —certain peas for instance. The seed should be slightly moistened, and mixed with a little red lead so that the seed is avoided by vermin. Birds, also, are very apt to peck and destroy seedlings. Where netting is not available, three or four strands of black cotton stretched over the rows on sticks will often serve to keep birds away.

Potato Clubs.

THE Agricultural Organisation Society is advising the starting of Potato Clubs in various parts of the country more or less on the lines of such a club originated some time ago by Lady Hylton in Somersetshire, and since adopted at Wivelsfield (Sussex). The plan of these clubs seems to be capable of easy adaptation to practically any district. Briefly, the method is as follows: The residents of a village or district form themselves into a club or society for the purpose of growing potatoes primarily for their own consumption. They hire a piece of ground from a farmer at a certain rent; the rent is not paid in cash, but is deferred until such time as the potato crop may be lifted and is then settled on an agreed basis. The same system is followed in relation to the ploughing of the land; this is done by a local farmer, or a man is employed; and the price of his work is booked against the forthcoming crop. Seed is obtained locally, as a rule, on similar terms. A price per hour is fixed for the labour of men, women and children in the village or district, and an arrangement is made by which they shall work on the potato plot as opportunity occurs. No immediate payment is made for labour, but the time put in by each person is booked, and in due course this liability is also discharged in potatoes, not in cash. If there is a surplus of crop after the costs of rent, ploughing, seed, and labour have been dealt with, this surplus is sold and the proceeds divided proportionately among the various parties concerned.

Among neighbours, as a rule, there will be little fear of dishonesty; but if this seems possible it may be dealt with, so far as the labour question is concerned, by the appointment of a committee of three or four persons, and the provision of a time-book to be kept at a cottage near the potato plot. Intending workers will book in before commencing work and book out after finishing work. The members of the committee will be empowered to inspect the time-book at all reasonable hours, and to compare the entries with the labour in the field. Suitable penalties for sharp practices may be imposed if deemed necessary.

Open-Air Pig-Keeping in Kent.

FURTHER evidence of the success which may attend the open air system of pig-keeping is afforded by an instance in Kent, communicated to the Board by Mr. W. Cobbett Barker, of Bryant House, Rochester.

Mr. Barker owns some poor, hilly, grass land, studded with thorns and scrub, on to which he has turned his breeding sows. Shanties are put up at a selected spot for a few months only, and new ones are afterwards erected elsewhere on the land. The sows lead a very active life; they are out in the open all the year round, and "rough it" in every sense of the word, except that they are given peas and beans whenever available. While it must be admitted that Mr. Barker's boar is probably very sound, his sows have done remarkably well. Uniformly large litters of from 8 to 16 are obtained, and an average of from 10 to 11 pigs reared, twice a year.

The open-air method of pig-keeping must be one of the best ways of improving such poor land as that mentioned above, and at the same time increasing the head of pig stock in the country at a time when the cost of feeding stuffs is exercising an influence in the opposite direction.

⁂ Mr. S. F. Edge's system of keeping pigs on waste woodland was described in this *Journal* for January, 1916, p 977. In the *Journal* for March, 1917, instances of successful open-air pig-keeping in Gloucestershire and Cornwall were given on pp 1235 and 1236.

THE following Note has been communicated by the Agricultural Organisation Society:—

Pig-Feeding Schemes.

In connection with the Glamorgan Collieries, controlled by Lord Rhondda, a piggeries association on novel lines has been started. A number of the workmen having expressed a wish to begin pig-keeping, the Company agreed to erect 20 pigsties to be let to its employees for the purpose of pig-fattening on co-operative lines. Each member of the association must hold one £5 share, but must not hold more than one. Pigs and feed are to be bought collectively and the profits of the scheme divided equally amongst the members from time to time.

The Smallholders' Pig Association of Calne (Wilts) is an interesting enterprise that may appeal to the inhabitants of other villages. It aims to supply young pigs or feeding stuffs, or both, on credit or the instalment plan, and generally to help the would-be pig-keepers who are too poor to finance themselves.

At Devizes (Wilts) the Town Council has inaugurated a municipal pig-keeping scheme. A firm of local butchers have lent sties, a committee of local experts are superintending the experiment, and a local veterinary surgeon is giving his services free. The inhabitants generally for their part are keeping all waste vegetable matter and other possible pig food separate from the house rubbish, and it is being collected systematically.

Co-operative pig-keeping societies have been started at Chorley Wood, Amersham, and elsewhere on a simple and commendable plan. Well-to-do people with a little money to spare have been asked to put this down for the purpose of renting land, building sties, buying pigs and feeding-stuffs; people with no money to spare have been asked to give their labour in preparing the land, buildings, etc., and in attending to the stock. The co-operating workers are credited with 6*d.* per hour towards shares in the society, and eventually it is hoped that their holding will approximate to that of the financiers of the scheme. Any profits will be divided, and in several of the places where these co-operative pig societies have been started, should they prove successful, poultry, rabbits, etc., will also be handled.

Short Term Credit for Farmers.*

1. THE President of the Board of Agriculture and Fisheries has made arrangements with the leading banks for lending money to farmers for the purchase of seeds and manures for growing wheat, oats and potatoes.

2. Applications must be approved by the War Agricultural Executive Committee for the county in which the applicant's land is situated, and should be addressed to the Executive Officer of the county, whose address is given below. [An application form is printed on page 3 of the leaflet, and may be torn off and used for making an application.]

3. If the grant of credit is approved by the Committee, the applicant will be able to order the seeds or manures required, and the bill will be paid through a bank, on the applicant signing a promissory note, undertaking to repay the amount within nine months with interest at the rate of five per cent. per annum.

A list of the banks that have agreed to give credit under this scheme is printed on page 93.

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* Reprint of Special Leaflet No. 72, copies of which may be obtained on application to the Board.

List of Executive Officers.

ENGLAND.

Beds	J. C. E. Robinson, Shire Hall, Bedford.
Berks	G. S. Bedford, Shire Hall, Reading.
Birmingham, City of	C. Napier Clavering, 3, New Street, Birmingham.
Bucks	Howard Jones, Denham, Bucks.
Cambs	W. R. Folgate, School of Agriculture, Cambridge.
Isle of Ely	(*Secretary*) E. E. Paynter, County Hall, March.
Cheshire	R. Douglas Wright, 49, Northgate Street, Chester.
Cornwall	F. R. Pascoe, County Hall, Truro.
Cumberland	G. W. Gilbanks, 5, Castlegate, Penrith.
Derby	J. R. Bond, County Education Office, St. Mary's Gate, Derby.
Devon	R. F. Woodcock, 50, Queen Street, Exeter.
Dorset	T. R. Ferris, County Offices, Dorchester.
Durham	F. P. Walker, Armstrong College, Newcastle-upon-Tyne.
Essex	R. Hunter Pringle, 49, Russell Square, London, W.C.
Gloucester	G. H. Hollingworth, Shire Hall, Gloucester.
Hants	E. H. Lunn, The Castle, Winchester.
Isle of Wight	A. E. Thurgood, 8, Southsea Terrace, Portsmouth.
Hereford	H K. Foster, 3, Offa Street, Hereford.
Herts	G. J. Turner, Cole Green, Hertford.
Hunts	W. P. Theakston, Estate Office, Huntingdon.
Kent	(*Secretary*) G. H. Garrad, Sessions House, Maidstone.
Lancs	Dr. T. Milburn, County Offices, Preston.
Leicester	T. Hacking, 33, Bowling Green Street, Leicester.
Lincs :	
Parts of Holland	L. G. Harvey, Osborne House, Spalding.
,, *Kesteven*	F. Wakerley, 64, London Road, Grantham.
,, *Lindsey*	H. C. H Tong, County Council Offices, Lincoln.
Middlesex	H. G. Crothall, Guildhall, Westminster, S.W.
Norfolk	H. Giles, 27, Prince of Wales Road, Norwich.
Northants	J. J. Green, County Hall, Northampton.
Soke of Peterborough	E. S. Tett, Estate Office, Wansford, Peterborough.
Northumberland	(*Secretary*) C. Williams, Moot Hall, Newcastle-on-Tyne.
Notts	W. R. Wintour, Shire Hall, Nottingham.
Oxford	W Lester Smith, County Offices, Oxford.
Rutland	W. H. Hollis, 18, Catmos Street, Oakham.
Salop	(*Secretary*) F. Crowte, Shire Hall, Shrewsbury.
Somerset	(*Secretary*) N. Oldfield, 68, Boulevard, Weston-super-Mare.
Staffs	J. Hotchkiss, County Education Offices, Stafford.
Suffolk, East	A. W. Oldershaw, County Hall, Ipswich.
,, *West*	C. F. Pattle, Shire Hall, Bury St. Edmunds.
Surrey	H. E. Cooke, St. Ives, Penrhyn Road, Kingston-on-Thames.
Sussex, East	(*Secretary*) G. Montagu Harris, County Hall, Lewes.
Sussex, West	W. Lawson, County Hall, Chichester.
Warwick	B. Bull, Martin, Rugby.
Westmorland	J. W. Lowther, 15, Lowther Street, Kendal.
Wilts	A. Boa, County Offices, Trowbridge.
Worcester	S. Lander, 3, Sansome Place, Worcester.
Yorks—E. Riding	(*Secretary*) J. Bickersteth, County Hall, Beverley.
,, *N. Riding*	S. Dougill, County Hall, Northallerton.
,, *W. Riding*	(*Secretary*) W. Vibart Dixon, County Hall, Wakefield

WALES.

Anglesey	Griffith Jones, Shire Hall, Llangefni.
Brecon	R. E. H. Williams, District Valuer's Office, Brecon.
Cardigan	John Jones, Cwmere, Felinfach.
Carmathen	D. Johns, Education Offices, Carmarthen.
Carnarvon	Evan R. Davies, Education Offices, Carnarvon.
Denbigh	Gomer Roberts, Llanfair Villas, Llanfair, near Ruthin.
Flint	J. P. Griffiths, Preswylfa, Penyffordd, Chester.
Glamorgan	T. F. Pritchard, 13, St Andrew's Crescent, Cardiff.
Merioneth	R.R. Jones, Cefntrefor Fawr, Talsarnav, Merioneth.
Monmouth	W. J. Grant. County Council Buildings, Newport, Mon.
Montgomery	J. L. John, Agricultural Offices, Welshpool.
Pembroke	(*Secretary*) H. E. H. James, 8, Victoria Place, Haverfordwest.
Radnor	D. Thomas, Llwynon, Builth Wells.

List of Banks that have agreed to provide Special Credit Facilities for Farmers.

Barclays Bank, Limited.
Beckett's Bank, Leeds.
The Capital and Counties Bank, Limited.
The County and Westminster Bank, Limited.
Fox, Fowler and Company's Bank, Wellington, Somerset.
The Bank of Liverpool, Limited.
Lloyds Bank, Limited.
The London City and Midland Bank, Limited.
The London Joint Stock Bank, Limited.
The London and Provincial Bank, Limited.
The London and South Western Bank, Limited.
The Manchester and Liverpool District Banking Company, Limited.
Martin's Bank, Limited.
The National Bank, Limited.
The National Provincial Bank of England, Limited.
The Nottingham and Nottinghamshire Banking Company, Limited.
Parr's Bank, Limited.
The Union of London and Smiths Bank, Limited.
The Union Bank of Manchester, Limited.
Williams Deacon's Bank, Limited.

The Future Position of Horse Breeding.

AT the War Office on 20th February, 1917, the Earl of Derby, K.G., Secretary of State for War, and the Right Hon. R. E. Prothero, M.V.O., President of the Board of Agriculture, received a deputation from members of the Hunters' Improvement and National Light Horse Breeding Society.

The Hon. Alexander Parker, in referring to the very grave alarm with which the Society viewed the future prospects of the breeders of light horses and of the horse supply of the country remarked that the Society, while encouraging the breeding of the highest class of hunter, had always felt that by so doing it was indirectly assisting to produce a large number of horses necessary for the Army. It was undoubtedly in the hope of obtaining the high prices that good hunters commanded, that the majority of breeders of light horses were induced to continue breeding. The Society, however, had long felt that the industry required considerable Government help to raise the standard of the horses that were being bred, so that there might be a sounder and more useful class of horse in the country in case of emergency. The Society fully realised that the supply of horses of the artillery type was dangerously deficient, and it was anxious and ready to co-operate in any scheme whereby this state of affairs might be rectified.

In June, 1910, the Horse Supply Committee under Lord Faversham's chairmanship issued an important Report containing numerous suggestions, and Mr. Parker pointed out that these recommendations were adopted, almost in their entirety, by the Board of Agriculture and Fisheries; and the Society considered that, in view of the limited amount of money at their disposal, the Board had done a vast amount towards putting new life into an industry which was rapidly crumbling away.

In August, 1915, Lord Selborne, the then President of the Board of Agriculture and Fisheries, in consequence of the very urgent representations of the War Office as to the serious position of the horse supply of the country, appointed a Committee under Lord Middleton's chairmanship "to consider and advise the Board of Agriculture and Fisheries as to what steps should be taken to secure the production and maintenance in England and Wales of a supply of horses suitable and sufficient for military purposes, especially on mobilisation." The Society respectfully begged perusal of the Report, which clearly set forth the position of horse breeding in this country, and at the same time offered some valuable suggestions whereby the industry might be put on a sound footing The conclusions arrived at by the Committee were summarised at the end of the Report under fourteen heads, nine of which applied to the Board of Agriculture and five to the War Office.

The Society cordially approved of these conclusions and recommendations, but much regretted that all the labour of the Committee, which was considerable, appeared to have been in vain, inasmuch as in no single instance had its recommendations been followed with the exception that the Board were seriously considering the compulsory annual registration of stallions.

The Society felt that were the Government to guarantee adequate annual funds, so that an advance might be made on the lines suggested in the Report, light horse breeding might be put on a highly satisfactory and sound basis. The crux of the matter was that the breeder had no remunerative market to look forward to Before the War he could rely on a market, circumscribed though it might be. There was the Hunter market and the Foreign market; these were the only two that it paid to breed for. Both these were gone. All he could now hope for was the totally inadequate price that he may expect from the War Office, added to which he had no one to break his young horses and the cost of fodder was prohibitive. Fewer mares were sent to the horse last year compared with 1915, and it was the Society's firm conviction that fewer still will be sent this year. The position was indeed deplorable.

It appeared to the Society, therefore, that unless something was done, and done quickly, to guarantee to the breeder a fair market for his stock, not only would the breeding of light horses decline to a minimum but that the interest which had been kindled in the industry with considerable success by the Board during the last six years would dwindle away, and that it would take a generation and a very heavy expenditure to resuscitate it. To create this market they realised that money must be forthcoming from the Treasury not only to enable the Remount Department to pay more for their horses, but also to enable them to buy unbroken horses at three years old, and so relieve the breeder of stock, the keeping of which he now finds to be a burden and one which is very general throughout the country. In order, however, to get the best possible results from the money spent on horse breeding the Society considered, that, as recommended in paragraph 77 of the Report of Lord Middleton's Committee, an expert and adequate staff is essential, inasmuch as the success of any National Horse-Breeding scheme must depend on proper supervision and continuity of policy.

In conclusion Mr. Parker said that the object of the deputation was, if possible, to obtain some definite statement as to what breeders may look forward to from the Government, so that they may clearly understand their position and formulate their plans for the future accordingly, as on this depends the question as to whether the country will be in a position to produce and maintain a supply of horses suitable and sufficient for military purposes. We have been able during this War to import vast numbers of horses from overseas, but it would be madness to rely on being able to accomplish this with such comparative ease again.

The Council of the Hunters' Improvement and National Light Horse Breeding Society, having duly considered the matter, were of opinion that they would be failing in their duty did they not bring to notice the serious position of the horse supply of the country.

Sir Gilbert Greenall, speaking on behalf of the Royal Agricultural Society, remarked that he was quite sure the Council would endorse everything that Mr. Parker had said; they felt that there were lots of difficulties with which to contend, but one thing they were very certain of, and that was that if anything was to be done it should be done at once before the season starts.

Mr. Prothero, who first replied to the deputation, stated that the Board of Agriculture appreciated very warmly the valuable assistance they had had from the Hunters' Improvement Society, not only in preparing their scheme originally, but in giving effect to it. He noticed that all the speakers were members of the Advisory Committee of the Board of Agriculture.

The Board's scheme had been a very considerable success in the past. Since its inception the number of thoroughbred stallions had been increased, and they were much better than they used to be, and he thought that a very strong point. Then, also, the voluntray scheme for the registration of stallions had been very successful, remarkably so. It showed that the Board's registration had a commercial value, and this was a matter which promised well for the future.

The aim of the Board now, as it always had been, was to grade up and improve the horses bred, and they thought that improvement in quality was really more important than increase in quantity; and although the misfit always must come every now and then, it was more than ever necessary that breeders should take the greatest care in the selection of the mares, in the choice of the stallions, and the care of the young stock. In all those points Mr. Prothero was sure he might rely on the Society to do their utmost with the farmers in their different localities.

He agreed with Mr. Parker that the crux of the whole situation was having a remunerative market. There was no doubt that that was so.

If breeders saw their way to produce horses at a reasonable profit, there would be plenty of horses bred, but in order to do this they must aim at really very high-class horses. Horses of that class will, he hoped, before long be wanted again for hunting, which, after all, was the backbone of the light-horse breeding industry. Without it we could not hope to revive the industry. But he did hope that the War Office would be able to give some assurance that the Army will become a larger and more remunerative market than heretofore, and that the farmer will be in that way encouraged to produce horses which, if they miss the hunter market, can yet be sold at a profit for Army purposes.

So far as the Board was concerned, they proposed to carry out the first conclusion of Lord Middleton's Committee's Report, to protect the farmer from unsound stallions by compulsory annual registration of all stallions that are travelled for a service fee or publicly exhibited for stud purposes. In the next place, they proposed to arrange for the inspection by the Board's officers of stallions recommended for Board's Premiums. The Board would also be prepared, if and when they got Treasury sanction, to purchase a few stallions every year, not of course in substitution of those provided by private enterprise, which they should not wish for a moment to attempt, but to supplement those which are so provided.

The Board did not contemplate taking any action at the moment in regard to brood mare schemes, or the award of prizes for mares and foals. But it was quite obvious that if they were going to buy stallions, if they were going to run stallions of their own as well as to subsidise stallions, they must have an additional expert staff, and they must reconstitute the Board's Advisory and County Committees if any comprehensive national breeding scheme is to be adopted, and again, subject to Treasury sanction (which is not always easy to obtain), it was proposed to make that part of the policy of the Board.

Lord Derby, who followed Mr. Prothero, thanked the Hunters' Improvement Society for the assistance given to the War Office by their members, and said that as regards the riding horses, as long as racing, hunting, and polo continue, speaking for himself, and he thought he could speak for the Army also, he should view with the gravest concern anything which threatened permanently to interfere with any one of these sports. As far as he was concerned he should always support all three.

As to the classes of Army horses—light draft, riding horses, and heavy draft—it was difficult to say what were likely to be the requirements of the Army, but, of the animals now serving with the Army in France, 54 per cent. were light draft, 30 per cent. were riding horses, and 16 per cent. were heavy draft. Of the total riding horses one quarter only belonged to Cavalry Divisions, and of the whole number of horses of all kinds, only 10 per cent. belonged to Cavalry Divisions. This gave some idea of the proportion of horses required for the Army at war strength, and led to another important factor, viz., that the peace strength was but a small proportion of the war strength.

In our own scheme of government, as well as among the great military nations of the Continent, the duty of maintaining the horse stock of the country at a suitable level was always assigned to a civil department. It was not for the War Office to venture to interfere in the business of the Agricultural Department, but merely to say what it wanted and to give all the help it could on the lines agreed between the two Departments. He was sure that Mr. Prothero could rely on the active co-operation of the War Office.

Though he would not be in office when peace methods were decided, and therefore could not pledge his successor, he was now prepared to recommend to his successor the adoption of the Selborne Committee's suggestions as to the future action of the War Office as regards their method of buying horses. A larger portion of the annual purchase would, he trusted, be made in Great Britain, and, after the War, he hoped that the War Office would buy what it could from breeders direct at 3½ years old at a fair price.

Horse breeding should be reasonably profitable with a mare that could earn her living on the farm, if premium or State-owned stallions were provided at nominal fees, and possibly a market for the produce at 3½ years old. As regards the market, it was quite impossible to make any forecast of what the future strength of the Army might be, but he was probably within the mark if he said that the number of horses bought annually for the Army after the War would not be less than those that were bought before the War. The War Office would certainly (speaking with regard to the Territorials) see whether they could not do something in the way of boarding out in order to help both their training and the horse-breeding industry.

It would never pay to breed inferior stock, whether for racing, for light draft horses, or for heavy draft horses—it was only the best that would ever pay, and it was only the best that could ever be encouraged.

OFFICIAL NOTICES AND CIRCULARS.

LABOUR—HORTICULTURE—PRICES—PASTURE LAND—HOPS—MISCELLANEOUS.

LABOUR.

The following Circular Letter, dated 2nd March, was issued by the Food Production Department of the Board, to War Agricultural Committees in England and Wales.

Soldiers for Agricultural Work.

SIR,—1. The War Office is prepared to provide a certain number of men to assist in agricultural operations in England and Wales. Some of these men will be provided from the Home Defence Force and others from the Army Class W Reserve.

2. *Home Defence Force Men.*—These men, 12,500 in number, are intended for the work of spring cultivation and will be subject to recall on 15th April. Whilst the War Office cannot guarantee that all these men will possess a knowledge of agriculture they have undertaken to select, as far as possible, fit and able-bodied men with such knowledge. The demand for these men should be ascertained by the War Agricultural Committee of each county, and the Board notified of the number likely to be required. Certain military depots have been selected to be used as distributing centres, and the War Office will move men to these depots to meet the demand for such labour as soon as the numbers needed are made known to them by the Board. As stated in the Board's telegram of to-day's date you should telegraph to the Board immediately the number of such men you can place with farmers forthwith.

3. *Army Class W Reserve.*—In view of the difficulties experienced in satisfactorily utilising the services of combatant prisoners of war under the conditions laid down by the War Office, an arrangement has been come to by which 4,000 able-bodied soldiers belonging to Infantry Works Battalions will be transferred to the Class W Reserve, and placed at the disposal of the Board in lieu of the 4,000 combatant prisoners of war that were allocated for agriculture in January last. These soldiers will, subject to unexpected military exigencies, remain in agriculture till the end of the War. It is hoped that in cases where the schemes prepared under the conditions described in the Board's Circular (A 287/C), dated the 16th January, relating to the employment of prisoners of war have reached an advanced stage, it may be possible to send non-combatant prisoners, but a further letter will be addressed to you on this subject in a few days. In the meantime no further steps should be taken by your Committee in connection with schemes for the employment of such prisoners.

4. In addition to these 4,000 soldiers, at least another 6,000 men of lower medical categories, making for the present 10,000 in all, will be provided from classes of enlisted men not reserved for Home Defence, and will also be available for farm labour until the end of the War, unless they are recalled for urgent military reasons. These men, until allotted to individual farmers, will be stationed at the military depots referred to above.

5. Any farmer who wishes to employ men belonging to either of those two classes, namely, the Home Defence Force men temporarily available and Class W Reserve men probably available until the end of the War, should make an application to the County War Agricultural Committee, and will be required to fill in a form of application stating that he agrees to the terms under which the soldier is being lent to him. Special forms are being printed for this purpose.

6. When the farmer boards and lodges the men, he will pay the rate of wage current for agricultural labourers who live in, otherwise, he will be required to pay the rate current for agricultural labourers who live out. When the Officer Commanding Agricultural Company desires information as to what the current rate is or what are fair wages for overtime work, or piece work, whether for men living in or out, he will refer to the War Agricultural Committee, whose decision will be final. No payments will be made by the farmer to the soldiers, but all amounts will be paid weekly to the Officer Commanding Agricultural Company. The hours of work will be those customary in the district.

7. The farmer will not have to pay railway fares, but will be required to make arrangements, at his own expense, for the conveyance of the men between the railway station and the farm, to provide all necessary tools and appliances, and is to insure the men under the Workmen's Compensation Act, but he will pay no contribution for Health Insurance. *He may dismiss a man on giving one day's notice, or one day's wages in lieu thereof.* The man will thereupon return at once to his unit. On the termination of the engagement, the farmer will complete a form to be brought by the soldier, and return it by post to the Officer Commanding the unit to which the soldier belongs, stating the reason for which the engagement has been terminated.

8. It is suggested that your Committee should take steps to make this scheme (which supersedes that described in Army Council

Instruction 1056 of May, 1916) known without delay to the farmers in the county, whether by notices in the Press or by sending out posters. *It is important to emphasise the need for making instant application for the services of men of the Home Defence Force who will be available only until the middle of April*, and even in the case of the Class W men, applications should be made as soon as possible. It will be open to your Executive Committee to apply for any of these soldiers in connection with the cultivation of land on which the Committee enters.

9. The maximum number of men of each class that it is hoped will be available for your county is stated in the covering letter, which also contains the address of the Army depot to which your Committee should forward applications for the men required in your county. Your Committee should also keep the Board informed at least once a week of the number of soldiers who have been applied for so that the Board may advise the War Office of the demand for men likely to be made on each of the depots.

10. As these applications are likely to be numerous and urgent I suggest that the War Agricultural Committee should appoint a sub-committee to deal with them, if necessary co-opting one or two persons who can give their whole time to the work for the next fortnight or longer. The Sub-Committee might have a special secretary of its own, and farmers and Employment Exchanges should be asked to submit all applications to the Secretary of the Sub-Committee direct at a separate address in order to prevent the ordinary work of the Executive Committee being delayed. Voluntary assistance might be sought in connection with the clerical work involved.

11. The Board of Agriculture recognise that in connection with this scheme there are two inherent difficulties which must be faced. Firstly, a proportion of the men will be untrained in agriculture; secondly, some of the men may find the conditions of country life unattractive. It is important that your Committee should take all possible measures to encourage farmers to teach any untrained men their work, and to make the best of this labour now available. *They should also be urged to make the men as comfortable as possible.*

I am, etc.,

ARTHUR LEE, *Director-General.*

THE following Notice, dated 20th March, 1917, has been issued by the Food Production Department of the Board:—

Notice to Farmers: Military Service.

To whom the Military Service Acts apply.—1. The First Military Service Act of 1916, known as "the Principal Act" applied to single men. The Military Service Act, 1916 (Session 2), known as "the Amending Act," extends compulsory military service to all male British subjects ordinarily resident in Great Britain who have attained, or hereafter attain, the age of 18 years, and who had not attained the age of 41 years before the 24th of June, 1916, subject to certain exceptions amongst which are members of His Majesty's Regular or Reserve Forces, which exception includes men who are voluntarily attested under the Group System (commonly known as Lord Derby's Scheme) in Section B, Army Reserve.

2. Men who came within the provisions of the Principal Act, *i.e.*, men not voluntarily attested who, on the 2nd of November, 1915, were single or were widowers without children dependent on them,

and who had attained the age of 18 years on the 15th of August, 1915, and had not attained the age of 41 years before the 2nd of March, 1916, should have made application for exemption before the 2nd of March, 1916.

3. A man who has been discharged from naval or military service on the termination of his period of service is not excepted on this ground.

4. Every man to whom the new Act applies and who came within its terms on the date of the passing of the Act, viz., the 25th May, 1916, was, as from the "appointed date," the 24th of June, 1916, deemed to have been enlisted and to have been passed to the Reserve, unless he had been exempted from the provisions of the Act. If exemption was desired he should have applied to the Local Tribunal for a Certificate before the 24th June, 1916.

Persons who have attained the age of 18 years after the 25th May, 1916, or hereafter attain that age came or will come within the operations of the Act on the thirtieth day after the date on which they attained or attain the age of 18. (See paragraph 10 as to applications for exemption.)

Men Engaged in Certified Occupations.—5. The Board of Agriculture and Fisheries have certified, after consultation with the Army Council, that the work of men in the following list of agricultural occupations is work of national importance, and that *subject to the provisions as to individual certificates contained in the Regulations and Instructions*, the classes or bodies of men who are employed in these occupations, and who fulfil the conditions specified as to age, marital condition, and date of entering their present occupation, are exempted from the provisions of the Military Service Acts, 1916, or, *if they are voluntarily attested men*, from being called up for military service.

List of Agricultural Certified Occupations (England).—6. Farmer (including Market Gardener and Fruit Farmer)—Provided that—

(*a*) farming is his sole occupation and his personal labour or superintendence is indispensable for the proper cultivation of his holding ; or

(*b*) if he is partly occupied in another occupation, his personal labour or superintendence is indispensable for the proper cultivation of his holding and such cultivation is expedient in the national interest.

Agricultural Machinery, Steam Ploughs and Threshing Machines :—Attendant ; Driver ; Mechanic.

Farm—Bailiff, Foreman, Grieve, Steward (*unmarried men up to the age of* 30 *not covered by List*).

„ Beastman, Byreman, Cattleman, Stockman, Yardman ;
„ Carter, Horseman, Ploughman, Teamster, Wagoner ;
„ Hind (if Foreman or Ploughman) ;
(*Unmarried men up to the age of* 25 *not covered by List.*)

Shepherd.

Thatcher.

Stallion Man (a man who looks after and travels a stallion).

Hop, Fruit and Market Gardens :—Foreman. (*Unmarried men up to the age of* 30 *and married men up to the age of* 25 *not covered by List.*)

Seed Growing Industry* :—

Head of Department; Seed Expert. (*Unmarried men up to the age of* 30 *and married men up to the age of* 25 *not covered by List.*)

Forest-tree Nurseries :—

Seed Expert. (*Unmarried men up to the age of* 41 *and married men up to the age of* 31 *not covered by List.*)

NOTES.—Age means the age of the man on the 1*st May*, 1916.

A man under the age limits stated in the List, if found on examination by a Recruiting Medical Board, before his case has been decided by a Tribunal, not to be fit for General Service (Category A) or for Garrison Duty Abroad (Category B 1) is entitled to be treated as engaged in a certified occupation.

The only persons covered by the List of Certified Occupations are those whose principal and usual occupation is one of those included in the above List. By the use of the term "principal and usual occupation" it is intended to exclude from exemption those persons who may be only occasionally employed in work of a kind similar to that of one of the occupations, but who do not follow it in any regular fashion and are not really engaged in the occupation in the proper sense of the word.

Unmarried men in any of the occupations included in the List are covered only if they can show that they were engaged in the same occupation *on or before the date when the National Register was made, namely, the* 15*th August*, 1915.

Men who on the 2nd November, 1915, were unmarried or were widowers without any child dependent on them are to be treated as unmarried men for the purpose of the List.

How to Obtain and Send in Forms of Application for Exemption.—7. Applications for exemption must be made *in duplicate* on the prescribed form which may be obtained from the Clerk of the Local Tribunal, and which it is his duty to be prepared to supply. Applications for forms, and forms of application when filled up, must be addressed to the Office of the Clerk to the Local Tribunal, and may be delivered at or sent by post to that Office.

Grounds of Application for Exemption.—8. As regards men covered by the List of Certified Occupations, claims for exemption may be made on the ground that the man is engaged in an occupation certified by a Government Department and appearing on the official list of such occupations for the time being in force (*see* paragraph 5 and 6).

As regards men not covered by the List of Certified Occupations, *including men who are indispensable for the cultivation of the farm or the maintenance of the head of live stock upon it*, applications for exemption may be made

(*a*) on the ground that it is expedient in the national interests that the man should, instead of being employed in military service, be engaged in other work in which he is habitually engaged;

(*b*) on the ground that it is expedient in the national interests that the man should, instead of being employed in military service, be engaged in other work in which he wishes to be engaged;

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* In view of the importance of maintaining a supply of agricultural seeds, the Reserved Occupations Committee considers that farmers growing agricultural seeds in bulk for seedsmen should receive special consideration from the Tribunals with regard to the trained men required for the purpose.

(*c*) if the man is being educated or trained for any work, on the ground that it is expedient in the national interests that, instead of being employed in military service, he should continue to be so educated or trained;

(*d*) on the ground that serious hardship would ensue if the man were called up for Army service, owing to his exceptional financial or business obligations or domestic position;

and, if the man comes within the provisions of the Military Service Acts, 1916;

(*e*) on the ground of ill-health or infirmity;

(*f*) on the ground of a conscientious objection to the undertaking of combatant service;

and the Local Tribunal, if they consider the grounds of the application established, shall issue a certificate to the man in respect of whom the application is made.

Note.—Men covered by the List of Certified Occupations may also apply on the grounds (*d*), (*e*) and (*f*) above, although it may not ordinarily be necessary for them to do so.

Period within which Application must be made by any Voluntarily Attested Men Covered by the List of Certified Occupations.—9. An application must be delivered to the Local Tribunal in the prescribed form in duplicate not later than seven days after individual notice has been sent to the man by the Military Authorities calling him up from the Reserve for service with the Colours.

Men of 18.—10. With reference to the Proclamation dated the 30th January, 1917, calling up men of 18 for service with the Colours, the position with regard to applications to the Tribunals for Certificates of Exemption in respect of such men is as follows:—

In the case of men to whom the Military Service Acts apply:—

(*a*) Applications should be made before the 30th day after the date on which the man attained the age of 18 years.

(*b*) Applications may be entertained by the Local Tribunal if made after that date, *if good reason is shown.**

In the case of Voluntarily Attested men:—

(i) If *not covered by the List of Certified Occupations*, application should have been made in the case of men in Group A (*i.e.*, men born in 1898) not later than 10 days after the issue of the Public Notice calling up the Group in which the man is placed, *i.e.*, 9th February, 1917, and in the case of men in Group B (*i.e.*, men born in 1899) application should be made not later than a date 10 days after the day on which they attain the age of 18.

(ii.) Application in respect of a man *not covered by the List of Certified Occupations*, may be entertained by the Local Tribunal after the dates mentioned in sub-paragraph (i.) above *if good reason is shown*,* but in any case not later

* It must be shown to the satisfaction of the Tribunal that the failure to make the application within the proper time has arisen owing to the absence of the applicant abroad, or owing to any other cause which appears to the Tribunal to afford a reasonable ground for allowing the application to be so made.

than 7 days after individual notice has been sent to the man by the Military Authorities calling him up for service with the Colours.

(iii.) If *covered by the List of Certified Occupations*, application may be made not later than 7 days after individual notice has been sent to the man by the Military Authorities calling him up for service with the Colours.

Appeals from Decisions of Tribunals must be made within Three Days.—11. Appeal Tribunals have been established to which an appeal may be made by any person aggrieved by the decision of the Local Tribunal, or by the Military Authorities, including a decision of a Local Tribunal not to allow an application for the granting of a certificate of exemption to be made out of date. The Appeal must be made *not later than three clear days after the date of the written decision of the Local Tribunal*, and proper forms for the purpose may be obtained from the Clerk to the Local Tribunal. Further appeal may be made by leave of the Appeal Tribunal from that Tribunal to the Central Tribunal, but it is not intended that cases shall come before the Central Tribunal unless important questions of principle are involved, or unless there is some other special reason why an appeal should be allowed. Notice of appeal must be given not later than three clear days after the date of the written decision of the Appeal Tribunal. As an alternative procedure, any party present when the decision of the Appeal Tribunal is given may apply forthwith for leave to appeal to the Central Tribunal

How to Apply for a Renewal of a Certificate of Exemption.—12. If the Certificate has been granted in pursuance of the decision of an Appeal Tribunal varying the decision of the Local Tribunal any application for the renewal of the Certificate must be made to the appropriate Appeal Tribunal.

In all other cases applications for renewal must be made to the Local Tribunal.

Forms for the purpose may be obtained from the Secretary of the Appeal Tribunal or the Clerk to the Local Tribunal.

A certificate of exemption may, however, be granted by a Local Tribunal or by an Appeal Tribunal, subject to the condition that it shall not be renewable except on an application made with the leave of the Tribunal on whose decision the Certificate was granted. In such a case an application for renewal will not be entertained unless leave to apply has been given by the Tribunal which imposed the condition There is no appeal to a higher Tribunal against the decision of a Tribunal to refuse leave to apply for a renewal of a certificate.

Period within which Application for a Renewal of a Certificate of Exemption is to be made.—13. In the case of a man to whom the Military Service Acts apply and whose certificate ceases to be in force after the 15th March, 1917, any application for renewal may be made before, or within *two weeks* after, the date on which the certificate ceases to be in force.

In the case of voluntarily attested men any application for renewal must be made before the date on which the certificate ceases to be in force or not later than seven days after individual notice has been sent to the man by the Military Authorities calling him up from the Reserve for service with the Colours.

Applicants for Exemption not to be Called Up for Military Service while their Applications are still under consideration.—14. *Where an application has been made* to a Tribunal or *where Notice of Appeal to the Appeal Tribunal has been given* in the proper form and within the prescribed time, the man in respect of whom such application or notice of appeal has been made is not liable to be called up for service with the Colours until his case has been finally disposed of. If through inadvertence a Notice calling up the man for service with the Colours is sent to him while his case is under consideration, he should at once communicate with the Recruiting Officer and inform him of the facts of the case in order that the Notice may be cancelled

Powers of the Army Council and Military Representative in regard to Applications by Men for Certificates of Exemption and to Withdrawals or Variations of Certificates when granted.—15. Where a man either holds a certificate of exemption on the ground that he is engaged in a "certified occupation," or in the case of a voluntarily attested man, his name is marked in the Military Classification Register as not to be called up for service with the Colours on the ground that he is engaged in a "certified occupation," the Military Representative may apply to the Local Tribunal for a decision that the man should be rendered available to be called up for service with the Colours upon the following grounds, or either of them :—

(1) that the man's principal and usual occupation is not, in fact, one of the "certified occupations" ; or

(2) that, notwithstanding that the man's principal and usual occupation is one of the "certified occupations," it is no longer necessary in the national interests that he should continue in civil employment.

The Military Representative may object on the same grounds to a certificate of exemption being granted.

The Military Representative may also apply at any time to the Local Tribunal for the withdrawal or variation of a certificate of exemption granted to a man on grounds other than that he was engaged in a certified occupation.

The Army Council may also, by the issue of an Army Council Instruction, authorise the general review of all certificates of exemption granted to men or classes of men specified in the Instruction, and the Tribunal will thereupon review the certificates subject to the following provisions :—

(*a*) a date shall be fixed for the hearing of each case ;

(*b*) at least three clear days before the hearing the Tribunal shall send to the holder of the certificate and to the Military Representative notice in writing of the date and place fixed for the hearing.

THE following Circular Letter, dated 28th March, 1917, has been addressed by the Director-General of Food Production to the Secretaries of County War Agricultural Executive Committees in England and Wales :—

Release of Individual Soldiers for Agriculture.

SIR,—(1) It is considered desirable that the position with regard to the release of individual soldiers for the purpose of returning to their civil employment should be clearly explained.

(2) Although the War Office adhere to their opinion that the most desirable method of reinforcing labour on farms is by means of a system of sending detachments of soldiers to selected localities, yet the War Office are prepared to consider applications for the release of individual men to return to particular farms, provided the circumstances are really exceptional.

(3) The following are illustrations of what may be described as exceptional circumstances:—

(*a*) Where the soldier is the farmer himself and is required to manage the farm;

(*b*) where a son, owing to his father's recent decease, has become the virtual tenant and is required to manage the farm; or

(*c*) where the wife and family of the soldier are living in one of the farmer's cottages, and the soldier is in a low medical category.

As regards men serving overseas, an even greater degree of urgency is required to be shown before there is any likelihood of their release being favourably considered.

(4) In dealing with future applications for the release of individual men, it is proposed to refer the cases in your County to your Committee for their opinion, and reliance is placed upon your Committee not to recommend any case unless they are clearly satisfied that it is impossible for the farm to be properly cultivated (*e.g.*, by the use of soldier or other labour), unless the particular man is returned to his civil employment.

I am, etc.,
ARTHUR LEE,
Director-General of Food Production.

10,000 Farm Women Needed.

THE need of women for the land is very urgent in view of the fact that in the middle of April soldiers who are helping the farmers will be recalled. The actual workers required at once are 5,000 milkers,* 4,000 field workers, and 1,000 carters.

The women will receive a free outfit—high boots, breeches, overall, and hat—from the Government, and also maintenance during training, travelling expenses, promotion with higher pay for good work, and a minimum to start with of 18*s*., or the district rate, whichever is the higher.

Forms of enrolment are to be had at every post office and all employment exchanges.

Pooling of Labour on Small Holdings.

OWING to the demands of the Army for men, it is possible that some small holdings and allotments which, in normal times, are intensively cultivated, may be in danger of not being worked to their full capacity. It is very undesirable that the supply of home-grown food should be diminished owing to this cause, and where there are groups of small holdings or allotments every endeavour should be made to induce co-operative working, so as to ensure that they are fully cropped.

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* The requirements have been increased to 10,000 milkers since this Notice was first issued.

HORTICULTURE.

THE following Circular Letter, dated 9th March, was issued by the Food Production Department of the Board to Agricultural and Horticultural Colleges :—

Help of Colleges in Food Production.

SIR,—The present time offers a favourable opportunity for initiative on the part of Agricultural and Horticultural Colleges in encouraging within their several areas increased food production in allotments, small gardens, etc. The means to be taken by a college must depend on the kind of district in which it is situated, and in no case should energy now devoted to food production on an agricultural scale be diverted to this subsidiary albeit important subject. Nevertheless, wherever possible the college should be or become a centre for help and instruction in vegetable gardening. Where no horticultural department exists or limitation of staff prevents the agriculturists on the staff from taking an active part in this work, the college may nevertheless assist by establishing a Food Production Committee of competent professional and amateur gardeners, either independently or in association with the local authority, Women's War Agricultural County Committees or other local organisations already at work. The object of the Committee should be to encourage and assist the small cultivators in the district, and to ensure that new ground being prepared for vegetable crops shall be thoroughly well cultivated. (See letter to Town and Urban District Councils printed below.) The Committee might report in due course the results of its work to the Director-General of Food Production, who will be prepared to give the Committee any assistance it may require, for example, in providing expert advice and in supplying pamphlets on the different aspects of vegetable production.

I am, etc.,

ARTHUR LEE, *Director-General of Food Production.*

THE following Circular Letter, dated 9th March, was issued by the Food Production Department of the Board to the London County Council and the Councils of Boroughs and Urban Districts in England and Wales.

Local Authorities and the Cultivation of Gardens.

SIR,—In the Circular Letter issued by Lord Rhondda and Mr. Prothero on the 31st January last it was suggested that local authorities should immediately take all necessary steps to secure a full cultivation of available land within their districts, and should appoint working committees to give full effect to the Orders of the Board of Agriculture enabling Councils to secure land for cultivation.

Those Orders expressly except from compulsory acquisition gardens or pleasure grounds occupied or usually occupied with a dwelling house. It is considered that it would not be fair or reasonable to take over such land without the consent of the owner, but if such consent can be obtained, I am to suggest that Local Food Production Committees could do most useful work by organising arrangements for the cultivation of gardens attached to empty houses.

It is suggested that this work might be organised on the following lines. A Food Production Committee, consisting of members of the council and other local residents. might be appointed if this has not already been done. This Committee should then arrange for a public meeting to draw attention to the need for this work, to invite voluntary workers, including those who can give part of their time at regular stated periods, and to enlist the assistance of professional gardeners in the neighbourhood. Volunteers should be sought from all classes, and in particular the assistance of women should be invited. If a Women's War Agricultural Committee is in existence in the district, their co-operation should be enlisted.

Lists of suitable vacant gardens should be prepared and the permission of the owners obtained to allow their cultivation as a purely temporary war measure. It should be made clear to the owners that they are only asked to allow the use of the land for cropping this year, and that possession will be surrendered at once without making any claim for compensation if the house should be let. When the owner's permission has been obtained, arrangements should be made either to allot separate plots to individuals who have volunteered to work or to organise the cultivation of the whole garden on co-operative lines. In either case provision should be made so that the cultivators may obtain expert advice from professional gardeners or other competent persons.

Each district will be able to organise a scheme of this kind on the lines most suited to their own locality, but I desire to commend the matter to your special consideration. In the urgent need for increased food production no means to that end should be neglected, and it will often be the case that any spare-time labour available can be employed to greater advantage in cultivating garden ground which has until recently been under cultivation than in breaking up vacant building sites.

I am, etc.,
ARTHUR LEE, *Director-General of Food Production.*

THE following Notice was issued by the Food Production Department of the Board on 15th March:—

Help from Glasshouse Owners in the Supply of Spring Cabbages.

The recent severe weather has caused the destruction of a great quantity of spring cabbages in certain parts of the country. In order to remedy the loss in some measure, owners of glasshouses and frames may be of great assistance. But in order to help to provide a supply of plants which should come in during late summer they must sow as soon as possible. Since there is no time to write in order to inquire as to local needs, gardeners are asked to sow what they can and then to find out how many seedlings are likely to be required locally. They will thus know how many to prick out.

The following methods are suggested: method 1 being the more speedy, but requiring greater care and labour.

Method 1.—Sow at once an early maturing cabbage in boxes or pans in moderate heat, keeping close to glass all through. Prick out as soon as large enough and keep in heat until well established. Then gradually harden off in cold frames and finally in the open air. Transplant as soon as ready in good, firm soil.

Method 2.—Sow at once *thinly* in a seed bed made not more than a foot from the glass in a cold frame. Harden off by removing lights on all favourable occasions as soon as the plants are about four or five inches high. Draw straight from the bed to transplant.

The following varieties of summer cabbages, in order, were the quickest to mature in a recent comparative trial at the Royal Horticultural Society's Garden at Wisley :—

" Best of All,"	sent by	Messrs.	Barr & Sons.
" Harbinger "	,,	,,	Nutting.
" Express "	,,	,,	,,
" Earliest "	,,	,,	Sutton & Sons.
" First Crop "	,,	,,	Johnson.
" First "	,,	,,	Cooper, Taber & Co.

Appointment of Horticultural Representatives.

THE following Circular Letter, dated 26th March, 1917, dealing with the appointment of horticultural representatives, has been addressed by the Food Production Department of the Board to the Women's War Agricultural Committees and other organisations which are occupying themselves with the horticultural side of Food Production. Copies have also been sent to the County War Agricultural Committees and to the Executive Committees :—

SIR, or MADAM,—At the request of the President of the Board of Agriculture and Fisheries, I have undertaken the duty of endeavouring to organise the increased production of vegetables, etc., in allotments and cottage gardens, and, with this object, a special Horticultural Section of the Food Production Department of the Board has been established.

I am anxious to obtain the assistance of men and women interested in horticulture, and in rural life generally, who will act as Horticultural Representatives of the Department in rural and urban districts. The principal duty of these representatives would be to encourage, as far as possible by personal visits, the full use of all land suitable for horticultural cultivation, to assist small cultivators in obtaining supplies of seeds and tools, to help in finding the necessary labour and to promote, through the agency of Parish Councils and associations of local residents, the formation of Food Production Societies or Committees in every village and suburban district in the country.

In some counties a considerable amount of attention is already being devoted to the needs of small cultivators, and, in such cases, it is hoped to supplement rather than supersede the work of existing organisations. But, in other districts, little or no organised effort is being made, and it is considered desirable that in every district there should be some man or woman who could be regarded as definitely responsible for promoting the horticultural side of food production.

It is obviously desirable that such Representatives should act in close co-operation with the existing County Organisations, and I am to ask, therefore, that your Committee will be good enough to suggest to me the name and address of a suitable person in each rural and urban district in your County who would be willing to volunteer for the post of Horticultural Representative of the Department. It is hoped that the Horticultural Representatives would be co-opted on the War Agricultural Committee of their district if they are not already members.

Volunteer service is asked for, but, if necessary, the Department will be prepared to pay small honoraria, not exceeding £10 in any one case, to the Representatives towards their out-of-pocket expenses.

I am, etc.,

FREDERICK KEEBLE, *Director of Horticulture.*

Expert Advice on Gardening.

THE Food Production Department of the Board of Agriculture, in co-operation with the Royal Horticultural Society, has organised a body of expert gardeners who are giving free instruction and advice to allotment holders and rural, urban, and village food production societies. The "Panel of Patriotic Gardeners," which has been formed for this purpose, already numbers over 1,000 and comprises:

1. Gardeners who give advice and instruction in their immediate neighbourhood.
2. Itinerant instructors who are prepared to give advice in any part of the country.

The services of these advisers are given free of expense to any society or association engaged in the work of food production. Individuals who require advice are expected to defray out-of-pocket expenses of the instructors. Application for instructors should be made to the Director of Horticulture, Food Production Department, 72, Victoria Street, London, S.W. 1. It will be of the greatest assistance if neighbouring societies will arrange to make joint application for advice on consecutive days.

Importance of Gardening: National Service Regulations.

THE Director-General of National Service has agreed to the following recommendations, made by the Department of Food Production, on the subject of gardeners and National Service:—

A gardener exempt from military service who is cultivating not less than 1 acre of ground devoted exclusively to vegetables will be recognised as doing work of national importance, and instructions will be issued that gardeners who fulfil this condition should be left to continue their work. The acre may be either wholly in a private garden or part in a private garden and part in another private garden or allotment.

Similar consideration will be extended to a gardener, who, though cultivating less than 1 acre of vegetable garden, places his spare time services for the purpose of advice and instruction at the disposal of the local Food Production Society or other organisation formed for the purpose of increasing the vegetable food supply. Vacant situations which admit of the carrying out of these conditions may be filled by men who have enrolled as National Service Volunteers.

Except in the case of luxury fruits and crops, provision will be made for the similar retention of the minimum number of skilled men necessary to maintain cultivation in fruit gardens, fruit plantations, market gardens, and fruit and forest tree nurseries, and also glass-houses put to the use of essential food production.

On the other hand, luxury gardening, bedding out, lawn tending, path sweeping, path rolling, etc., will enjoy no consideration whatever;

on the contrary, in the event of places where gardeners are engaged in such work becoming vacant, they will not be allowed to be filled by men within the specified ages. It is not intended, however, to discourage more than circumstances necessitate the upkeep of collections of plants of great rarity or value, the possession of which in this country is a great asset to the horticultural industry.

PRICES.

Sale of Chopped Hay, and Oat and Wheat Straw in Great Britain.

THE Army Council have issued an Order, dated 14th March, to the effect that on any sale in Great Britain of hay and oat straw and wheat straw, chopped or chaffed and mixed, hereinafter called "Chop," and where such "Chop" does not contain more than 20 per cent. of straw, the price shall not exceed such prices as are set out in the appended Schedules. The prices are deemed to include all costs and charges for "Chop" delivered on to the purchaser's premises, excepting that where it is delivered in returnable sacks or bags, a sum equal to 7*s*. 6*d*. per ton may be added to the prices in Schedule 1, and of one halfpenny per stone to the prices in Schedule 2.

Schedule 1.—Maximum prices per ton which a dealer or retailer may not exceed for quantities of 10 cwt. and upwards for "Chop":—

England, £7 10*s*.
Scotland, £7 2*s*. 6*d*.

Schedule 2.—Maximum prices per stone which a dealer or retailer may not exceed for quantities of less than 10 cwt. for "Chop":—

England, 1*s*.
Scotland, 11½*d*.

Winter Milk Prices.

THE President of the Board of Agriculture and the Secretary for Scotland have considered with the Food Controller the subject of milk prices and the maintenance of the supply, and have agreed to the following statement:—

The prices to be fixed for next winter will be considered by the Agricultural Departments in good time before the period for making contracts arrives, so as to make the maintenance of milk production certain, and commercially profitable in comparison with other branches of the farming industry.

The Food Controller is issuing an Order amending the Price of Milk Orders, 1917, so that the increase in prices sanctioned by those Orders is based on the summer prices of 1914 instead of those of 1913. (See also below.)

Contract Prices for Winter Milk.

THE Food Controller, acting on the advice of the English and Scottish Boards of Agriculture, gives notice that, unless the prices of feeding stuffs are in the meantime substantially reduced, the winter contract prices for milk in 1917–18 will be not less than 1*s*. 8*d*. per gal.

Milk producers are also reminded that the Food Controller has already decided that, owing to the weather, the month of April is included in the winter months of 1916–17, on which winter contract prices are payable.

Price of Milk.

THE Food Controller announces that it appears from information which has reached the Ministry of Food that farmers in some cases are under a misapprehension regarding the summer prices of milk as fixed by the recent Order. It is therefore desirable to explain that the maximum price of milk sold wholesale in the coming summer will usually be 6½*d.* per Imperial gallon above the price which the farmer obtained in the summer of 1913. This will be the maximum price for milk delivered on the premises or at the railway station of the buyer under a contract to supply a minimum quantity. In the case of milk sold under other conditions the farmer may not charge more than 5½*d.* per gallon above the price of the summer of 1913. It is a summary offence against the Defence of the Realm Regulations to charge or ask a higher price than the maximum permissible under the Price of Milk Order.

Maximum Retail Price of Swedes.

THE Swedes (Prices) Order, 1917, made by the Food Controller, provides that, except under the authority of the Food Controller, no person shall sell or offer to sell any swedes or swedish turnips at a price (including the cost of bags or other packages) exceeding the rate of 1½*d.* per lb.

Official Prices for Maize.

OWING to the increased use of maize flour for bread-making the supply of maize available for feeding stock is likely to be much reduced in the near future, and the Board of Agriculture consider it desirable to take steps to protect purchasers of maize against excessive charges. The Board propose to notify weekly the price at which maize is sold at the ports of arrival by the selling agents of the Royal Commission on Wheat Supplies, and to indicate the additional charges for railway transport to the principal inland centres and allowances for cost of handling as may be considered reasonable.

Any purchaser of maize who considers that he is asked to pay an excessive price for maize should furnish particulars to the Director-General of Food Production, 72, Victoria Street, London, S.W. 1.

PASTURE LAND.

Breaking up of Pasture Land.

IN reply to an inquiry as to the protection against loss of landowner and farmers whose pasture land is broken up by an executive committee under the Cultivation of Lands Order, 1917, the following Letter has been addressed by the Board to Lord Desborough, the Chairman of the Land Union:—

I am directed by the President of the Board of Agriculture and Fisheries to say that he has received your letter forwarding the following resolution which has been passed by the Committee of the Land Union:—

> Having regard to the uncertainty which prevails among persons interested in land as to their position in the event of permanent pasture being compulsorily, or at all events without the consent of the owner, broken up, the Land Union will be glad to be officially informed what steps are being taken to protect owners and farmers from loss if, owing to a fall in prices, the land becomes in a few years' time unprofitable as arable land, and it becomes necessary to go to the expense of again laying the land down to pasture.

Mr. Prothero desires me to send you the following statement of his views on the subject, which he will be glad if you will communicate to the members of the Union.

While improvement in methods of tillage would, no doubt, result in a considerable increase in food supply, there can be no substantial increase in gross production without adding to the arable area. An actual addition to the land under the plough is, therefore, urgently needed, and Mr. Prothero is sure that landowners will, as a body, recognise the paramount claim of the necessities of the nation.

Powers have, therefore, been conferred on War Agricultural Executive Committees enabling them to require the breaking up of grass land, and, in the hands of practical agriculturists, Mr. Prothero feels sure that these compulsory powers will not be abused. But in carrying out their powers, the Committees have been instructed that they should not sanction the breaking up of meadow land or grass land which can more profitably be used as pasture, that their main object should be to secure in the first place the best possible cultivation of the existing arable land, and that they should not authorise the breaking up of grass land without considering whether, in view of the shortage of labour, etc., it may not be more profitable to improve it as pasture.

Mr. Prothero hopes, however, that, wherever practicable, committees will authorise the breaking up of any grass land of indifferent quality which, if broken up, would probably yield not only a greater supply of food, but more profit would be obtained from the land in its present condition.

The procedure which committees have been advised to adopt in dealing with applications from tenants who desire to break up grass land is that they should satisfy themselves that the permission of the landowner has been asked and refused, and that they should then arrange for the land to be inspected on behalf of the Committee by a practical farmer together with a qualified local land agent, surveyor or valuer, notice of the application being given to the landowner. If the Committee decide that it is desirable in the national interest to authorise the breaking up of the land, they can issue a direction to that effect which protects the tenant from any action or proceedings in respect of the consequent non-fulfilment of his contract of tenancy. (See Section 1 (2) of the Defence of the Realm (Amendment) No. 2 Act, 1915.)

If a landowner thinks that he can establish a claim for compensation for loss due to the action of the Executive Committee, he can place the matter before the Defence of the Realm (Losses) Commission.

Mr. Prothero hopes that this statement will show that there is no reason for alarm on the part of landowners, and that the policy of the Government in endeavouring to secure increased production from the land will be carried out with due safeguards for the interests of all concerned.

I am to add that Mr. Prothero recognises that any substantial measures of success in the direction of increased production must depend largely on whether assurances can be given to agriculturists that, if they adopt those forms of cultivation which are most beneficial from the national point of view, they will be protected from the risk of such cereal prices as ruled at the end of the last century and the beginning of this. This aspect of the matter is receiving Mr. Prothero's careful attention, and he will not fail to see that its importance is impressed upon the Government.

HOPS.

THE President of the Board of Agriculture and Fisheries has addressed the following Letter to all hop-growers :—

Appeal to Hop Growers.

Numerous representations have been received by Mr. Prothero as to the effect which the Regulations restricting the output of beer in the current year will have upon the demand for hops. The amount of beer which may be brewed this year has been fixed at 10 million barrels, and the hops required for this quantity of beer would be grown upon about half of the present acreage under hops. There exists also a considerable stock of hops in store. If the growers crop anything like their present acreage of hops the amount produced would be so much in excess of any possible demand that every grower would suffer heavy loss and might find his hops unsaleable.

At the same time the national need for the maximum production of food calls for the devotion of as much as possible of the rich, highly-manured hop land to the growth of crops which serve directly or indirectly for human food. Mr. Prothero understands that many growers have already begun to grub their hops and replace them by another crop. Owing to the shortage of labour grubbing cannot be carried out universally at the same time. Mr. Prothero does not desire such a complete destruction of the crop as would render the speedy regeneration of the industry impossible when the War is over. As a temporary measure potatoes, vegetables, root crops, and even beans can be grown between the rows without pulling the bines up, but leaving the plant to grow for another season.

Mr. Prothero considers that the interests of the industry and the nation will best be served by reducing the acreage to be cropped with hops during the present season by at least one half. This reduction should be spread as equally as possible among the farmers now growing hops. You are therefore asked to consider to what extent you can participate in this general reduction, and to that end to forward on the accompanying form a statement of (1) your acreage under hops in 1916, (2) the acreage you propose to crop in 1917, and (3) the acreage you have grubbed or propose to grub this season.

THE following Memorandum, dated 13th March, was issued by the Food Production Department of the Board to War Agricultural Executive Committees in the hop-growing counties :

Legal Position as to Grubbing Hops.

Mr. Prothero has received inquiries as to the procedure to be adopted by tenant farmers who are willing to assist in maintaining the food supply of the country by diminishing their acreage of hops and utilising the land for cereals and vegetable crops, but are deterred from doing so by the risk of liability under their contracts of tenancy.

In such cases the proposed cultivation should be submitted to the War Agricultural Executive Committee under section (2) of Regulation 2M, so that in proper cases a direction may be given by the Committee which can be relied on by the tenant as an answer to any claim by the landlord for breach or non-fulfilment of the contract of tenancy. This matter is at present regulated by section 1 (2) of the Defence of the Realm (Amendment) No. 2 Act, 1915, but it is intended under the Courts

(Emergency Powers) Bill to extend the scope of that provision so as to cover all claims arising out of compliance with directions given by War Agricultural Executive Committees under the powers conferred by the Defence of the Realm Regulations

MISCELLANEOUS.

Agricultural Tenancies

THE President of the Board of Agriculture and Fisheries has received from tenants of agricultural land, who have lately had notices to quit, inquiries as to their position in view of the recent declaration by the Prime Minister on the subject of the agricultural programme of the Government The Prime Minister indicated that Parliament would be invited to regulate the raising of rents by requiring that the consent of the Board of Agriculture and Fisheries to be given on certain definite principles, should be obtained to such increases The details of the proposed legislation, however, have not yet been settled, and the Board are not in a position to state how far it will affect the enforcement, after the commencement of the legislation proposed, of previous agreements for increase of rent or of notices to quit recently given

The Board apprehend that in some cases notices to quit have been served by landlords merely with the purpose of putting themselves in a position to bargain as to future rent, and that both the owners and tenants would desire to continue their present relations if the question of rent could be settled The tenants, however, in view of their uncertainty of tenure and inability to ascertain how their position will be affected by legislation, often feel themselves precluded from making the additional effort which the country requires at this time In these circumstances the Board hope that the notices may be withdrawn in those cases in which tenants agree to pay such increase of rent (if any) as may be sanctioned by the Board hereafter, with due regard to any legislation dealing with this matter during the present Session

Short Term Credit for Farmers.*

THE following Memorandum, dated 16th March, was issued by the Food Production Department of the Board to War Agricultural Executive Committees in England and Wales —

1. The President of the Board of Agriculture and Fisheries desires to inform War Agricultural Executive Committees that arrangements have been made with the principal banks, and approved by His Majesty's Treasury, whereby the banks will afford special credit facilities to farmers, against a Government guarantee, for the purposes, and subject to the conditions, set out below

2 The main object of the scheme is to promote the increased production of wheat, oats and potatoes by providing credit facilities for the purchase of seeds and artificial manures This will not prevent committees from recommending similar advances in respect of other crops, the growth of which in special cases may be a matter of urgent national importance, but in any case credit will only be given for the purposes

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* See also p. 91

stated, and no advances will be made for the payment of wages or other general purposes of cultivation.

3. Any farmer desiring to avail himself of the facilities will apply to the Executive Committee of the War Agricultural Committee for his county, stating :—

(*a*) The description and quantity of the fertilisers or seeds that he wishes to procure, and the source from which he suggests they should be obtained ;
(*b*) The class and acreage of the crop in respect of which the expenditure is to be incurred ;
(*c*) The reason for seeking assistance in obtaining special credit ;
(*d*) The name of the bank (if any) at which he has an account, or, if he has no banking account, the bank at which he would wish the credit to be provided.

4. The Executive Committee, after such inquiry as they may deem necessary, having regard to the purpose of the proposed expenditure and the position of the applicant, may approve the provision of credit, and in that case they will authorise the applicant to order from any firm or society approved by the Committee, goods of the description and value to be specified in the authority. It is suggested that use should be made of well-established co-operative trading societies, and committees will do well to draw up a list of such societies, as well as private traders, with whom they would approve of transactions taking place.

3. The applicant will place his order with the approved firm or society, together with the letter of authority, and request them to send to the Executive Committee the invoice announcing despatch of the goods. The Committee will endorse the invoice to the bank nominated and forward it to the applicant. The latter will present the endorsed invoice to the bank, who will pay it, and take from the applicant a promissory note agreeing to repay the amount with interest at 5 per cent. per annum on a specified date.

6. The banks named in the appended list have signified their willingness to make advances to farmers recommended by the War Agricultural Executive Committees at 5 per cent. per annum for a period not exceeding nine months, against a guarantee from the Government. The banks will be ready, at the request of the Executive Committee, to supply any information at their disposal with regard to the circumstances of an applicant, but they state that they cannot undertake any responsibility in giving such information.

7. The War Agricultural Executive Committee, in dealing with applications in accordance with paragraphs 4 and 5, will act on behalf of the Board. In the event of there being any delay on the part of a farmer in meeting his obligations under the arrangements indicated, the banks will themselves take all such steps as they would in ordinary circumstances take to recover the debt due to them, but in any case where the repayment of an advance is not secured, the Board will make good their guarantee.

8. More detailed instructions, together with suitable forms, will be sent to Executive Committees at an early date, but in the meantime this Memorandum will enable the committees to deal at once with any applications that may come before them.

Syrup for Bees.

THE Board of Agriculture remind bee-keepers who wish to make syrup for feeding their bees that (by permission of the Food Controller) special candy is obtainable for that purpose. This candy is so coloured and medicated as to be unfit for human food, while quite harmless to bees. It is sold by Messrs. James Pascall, Ltd., 100, Blackfriars Road, London, S.E. 1, at the rate of 10*d.* per pound. Syrup for spring feeding can be made by breaking up a 1 lb. cake of candy in 15 oz. (¾ pint) of hot water. The candy should be entirely dissolved and the syrup quite cool before it is given to the bees. For autumn feeding only 10 oz. of water (½ pint) should be used to 1 lb. of candy.

FEEDING STUFFS AND LIVE STOCK.

The President of the Board of Agriculture and Fisheries urges every Farmer and Stock-keeper to take immediate steps to meet the coming shortage of Feeding Stuffs.

OWING to the lack of tonnage and the necessity of restricting imports to the essentials of food and munitions of war, the farmer must be prepared for a reduced importation of feeding stuffs during the coming year of at least a million tons. In addition to this loss the milling regulations will deprive the industry of about half a million tons of offals, barley, maize, etc., which were formerly available for live stock feeding. This reduction of a million and a half tons represents about one-sixth of the total amount of concentrated feeding stuffs that were at the farmers' disposal before the War. At the same time the Board of Agriculture Census shows that in last June the numbers of live stock in the country were rather larger than ever before.

In the present national crisis it is necessary to bring in human food rather than raw materials for food, such as feeding stuffs for live stock, which can only be converted into a much smaller weight of human food. This decision will not be relaxed as long as the shortage of tonnage continues and the effect of the enemies' submarine campaign remains uncertain.

In view of the scarcity of feeding stuffs, it may become necessary to resort to some method of rationing the supply. The President is anxious to avoid this step if possible, because rationing always means great waste of power in organisation, much disturbance of the industry, and many cases of individual hardship.

Rationing can only be avoided if farmers generally will determine to reduce their individual demands upon the limited stock of feeding stuffs, just as the voluntary action of the people has been appealed to by the Food Controller in order to reduce the consumption of meat and bread in the country. Some men may be selfish and unpatriotic enough to observe no restraint in the consumption of feeding stuffs by their live stock; but, provided their numbers are few, it will be better to suffer some unfairness than resort to rationing.

The President therefore urges each farmer to think out for himself how far he can assist the industry in this national need by reducing the consumption by his stock of concentrated feeding stuffs, such as all kinds of cake, corn, and meal. It may be assumed that the restriction of supplies will fall mainly upon oats, barley, rice, maize and similar materials, but that the supply of oil seeds and cakes is likely to be less affected.

The shortage of feeding stuffs, which will become more pronounced as the season advances, renders it essential that farmers generally should adopt the policy of getting their live stock as far forward as possible upon the grass, green crops and roots of this summer and autumn. There will be a large call for home-produced meat, both for civil and army needs, as soon as it can be got ready, and stock raisers are expected to take every step to prepare to meet this demand. It will be necessary to effect a substantial reduction in the head of live stock in the country before next Christmas. This reduction should in the first place fall on the animals that are not wanted for breeding purposes. All such cattle (other than milch cows), sheep and pigs that can be got into reasonable condition for slaughter on the crops grown this season should be sent to market. Breeders are urged to aim at retaining for the future their younger and more promising animals, but to prepare for market their older animals, whose period of usefulness for breeding is drawing to a close, even though, under less difficult conditions as to food, they would be bred from for a year or two longer. To assist this necessary reduction in the number of cattle the Order restricting the sale of calves has been withdrawn, and only such calves as are of good quality for future milk or beef production or for breeding should be carried beyond the stage of veal.

The President is conscious that the advice to the farming community to reduce their live stock cannot be welcome, but it is dictated by a full consideration of the national needs at the present time. The long continuance of the wintry weather makes it doubly difficult for farmers to pursue the policy indicated, but he trusts that they will realise the gravity of the situation, and, putting their own inclinations aside, will co-operate in thus securing the needed supply of meat during the late summer and autumn and in reducing the head of stock that has to be carried through the winter.

In view of the necessity for economising food, the President is of opinion that all future fat-stock shows should be at once cancelled, and that the practice of offering prizes at the Christmas auction marts should be entirely abandoned. It would be undesirable to interfere with the sales of breeding stock, either of horses, cattle or sheep; but the President requests that the committees and other bodies in charge of such shows will take immediate steps to make it known that all animals ought to be shown in store condition, and that animals, on which food is wasted in order to bring them into high condition, will be disqualified and withdrawn from the sale. Only by the strict enforcement of some such condition can a stop be put to the waste of food so generally incurred in the feeding of breeding animals for show purposes.

The President appeals to every farmer to help in a united effort to meet a difficult situation. The Food Production Department of the Board of Agriculture and Fisheries is preparing to issue more detailed advice on the points enumerated above; but it is only by the willing determination of every farmer to subordinate his own requirements to the general weal of the industry that a serious danger can be met.

Economy in Feeding Stuffs.

IN view of the shortage of feeding stuffs, to which attention is called above, the President of the Board of Agriculture and Fisheries suggests that economy can best be effected in the following directions :—

(1) *Horses.*—Working horses must be so fed as to keep them fit for their work, but this can be done on a much smaller allowance of concentrated food than is commonly used by many owners. Every effort must be made to reduce the ration to the smallest limit consistent with efficiency. All pleasure horses should be turned out to grass, as soon as the season renders it possible. No corn can be spared for horses not engaged in productive work.

(2) *Milch Cows.*—It is necessary to take every step to maintain the milk supply, especially for next winter. The Food Controller has promised that the price of milk for next winter shall not be fixed at less than 1*s.* 8*d.* per gal., and this price will be raised should the weather or the shortage of food render it necessary. Having in view the Food Controller's undertaking that the price shall be such as to render the production of winter milk remunerative, the President trusts that every milk producer will take steps to maintain his milking herd. In this direction only there should be no restriction in the feeding such as would cause a reduction in the production of milk. Economy is, however, possible (i) by maintaining the cows as far as possible upon roots, green food and hay grown on the farm, (ii) by adjusting the ration to the milk yield, and by regular checking of the rations given. Cake should not be given to milch cows on the grass until there are signs that the milk yield is falling off from lack of keep.

(3) *Other Cattle.*—Large savings can be made in the amount of concentrated feeding stuffs usually consumed by cattle. The chief openings for economy are as follows : (*a*) Cake and other concentrated foods should not be given to store cattle other than calves until the final stage of fattening, (*b*) cattle should be sent to market in a less finished condition than has been customary, using smaller quantities of cake. Lean meat and a smaller proportion of dead weight are more economical to the Nation than prime beef, which, under present conditions, is an unpatriotic luxury.

(4) *Sheep.*—Sheep should be fattened as far as possible on foods grown upon the farm with a minimum of cake or corn. Leaner meat and earlier slaughter are necessary. Lambing for next season should be deferred until there is a prospect of keeping the ewes and lambs without the extensive use of concentrated foods. The production of early fat lambs should be guided by the same consideration.

(5) *Pigs.*—Materials such as barley or maize that can be used directly for human consumption should not be fed to pigs or any other farm stock. Pigs, however, can be very largely fed upon green stuffs, roots, silage, whey, scraps and waste generally, with a minimum of meal.

The President regards it as very important that every farmer should take his horse-keepers, shepherds and stockmen into his confidence, and impress upon them the importance of their help by keeping to the rations of horse corn and feeding stuffs which they are allowed. By fastening up in stables or mixing sheds the notices which will be issued with regard to the feeding of horses and stock, every man would be shown that he is being asked to assist the nation and not only his employer.

Notes on Crop Prospects and Live Stock Abroad.

THE *Bulletin of Agricultural and Commercial Statistics* for March 1917, issued by the International Institute of Agriculture, contains particulars concerning the production of cereal crops in 1916. The countries for which estimates are available are as follows:—In *Europe*—Denmark, Spain, France, Great Britain, Ireland, Italy, Norway, Netherlands, Rumania, Russia in Europe (48 Governments), Sweden, Switzerland; in *America*—Canada, United States; in *Asia*—British India, Japan; in *Africa*—Algeria, Egypt, Tunis.

Wheat.—The total production in the above mentioned countries is estimated at 322,010,000 qr. in 1916, compared with 426,529,000 qr. in 1915, a decrease of 24·5 per cent.

Rye.—In the specified countries, excluding Great Britain, Rumania, British India, Japan, Algeria, Egypt and Tunis, the total production is placed at 117,808,000 qr. in 1916, against 124,405,000 qr. in 1915, a reduction of 5·3 per cent.

Barley.—In the above named countries, excluding British India, the production is estimated to amount to 130,477,000 qr. in 1916, against 142,012,000 qr. in 1915, or a decrease of 8·1 per cent.

Oats.—The total production in the above-named countries, with the exception of British India and Egypt, is estimated at 336,411,000 qr. in 1916, or a reduction of 12·9 per cent. compared with the previous year when it amounted to 386,222,000 qr.

Maize.—In Spain, Italy, Russia in Europe (48 Governments), Switzerland, Canada, United States, Japan and Egypt, the production is placed at 331,413,000 qr. in 1916, compared with 382,826,000 qr. in 1915, the decrease being equal to 13·4 per cent. In Argentina and Australia the production is estimated at 7,854,000 qr. in 1916-17, against 19,587,000 qr. in 1915-16, or a reduction of 59·9 per cent.

Sowing of Winter Cereals in the Northern Hemisphere.—The areas estimated to have been sown with winter *wheat* in 1916-17 compared with the areas sown during the corresponding period of 1915-16, expressed as percentages, are as follows:—Spain 103, France 85, England and Wales 86, Switzerland 105, United States 102, India 108, Japan 100; with *rye*—Spain 90, France 90, Switzerland 105, United States 121; with *barley*—Spain 89, France 110, Switzerland 106, Japan 88; with *oats*—Spain 98, France 95.

Live Stock in Spain.—The numbers of farm stock in 1916 are as follows (the corresponding numbers in 1915 being shown in brackets):—Horses, 488,715 (512,453); cattle, 3,070,903 (2,926,170); sheep, 16,012,277 (15,994,608); pigs, 2,814,465 (2,883,081). (*Bulletin of Agricultural and Commercial Statistics*, March, 1917.)

Argentina.—The yields of wheat, oats, maize, and linseed for 1916-17 are officially estimated as follows:—Wheat, 8,750,000 qr., as compared with 21,560,000 qr. last season; oats, 3,340,000 qr., against 7,925,000 qr.; maize, 6,800,000 qr. against 18,600,000 qr.; and linseed, 102,000 tons, against 998,000 tons last season. (*London Grain, Seed and Oil Reporter*, 22nd and 28th March.)

Agricultural Conditions in England and Wales on 1st April.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales, state that the unfavourable weather during March hindered operations in the field, although a good deal was done in preparation of the land for crops Some spring corn was got in, but not much, and here and there a commencement was made with planting potatoes

The early sown wheat still continues satisfactory as a rule, but the late sown is a thin and poor plant The area sown with wheat is estimated to be about 8 per cent below that of last year The crop is very backward, and some damage seems to have been done by the March frosts Winter oats and beans also suffered considerably from the frosts

Seeds are very backward, and a good deal of damage was done by the frosts There generally is a good plant, however, and in many districts it is expected that they will show a good recovery with warmer weather.

The fall of lambs appears to be generally quite up to the average, but the very cold weather has been all against the lambs, and considerable mortality is reported among both ewes and lambs, particularly in the north Ewes are mostly in poor condition and again more especially in the north they are reported to be short of milk

According to the Board's *Monthly Agricultural Report* for 1st April, 1917, the supply of labour is very deficient, but the situation has been greatly relieved in nearly all parts of the country by the temporary release of men from the Army for farm work

Agricultural Labour in England and Wales during March.

The following local summaries give details regarding the agricultural position in the different districts of England and Wales .—

Northumberland, Durham, Cumberland, and Westmorland—The supply of labour is still very deficient, but the situation has been eased by the temporary release of men from the Army

Lancashire and Cheshire—Labour is everywhere short, but some relief has been given by the loan of men from the Army

Yorkshire—The deficiency is still felt, but soldiers have been doing good work Temporary labour, expecially in the case of horsemen, is scarce

Shropshire and Stafford—The supply of labour is very short, but the situation is being relieved by the employment of soldiers and women

Derby, Nottingham, Leicester, and Rutland—Labour is still deficient, but much assistance is being given by soldiers in some districts.

Lincoln and Norfolk—Labour continues to be seriously scarce, but in a few districts the situation has been eased to some extent by the release of soldiers

Suffolk, Cambridge, and Huntingdon—The supply of labour continues short throughout the division, but the situation is being relieved somewhat by the release of soldiers for farm work

Bedford, Northampton, and Warwick.—Conditions are slightly better, with help from soldiers, but little work has been possible owing to the weather

Buckingham, Oxford, and Berkshire.—The supply is short and work is backward in consequence. Military help, where available, has been advantageous.

Worcester, Hereford, and Gloucester.—The supply of labour is generally deficient, but the assistance rendered by the release of soldiers has to some extent relieved the shortage.

Cornwall, Devon, and Somerset—The supply of labour is deficient, but the position is now being improved by the release of soldiers and the employment of women. At the Lady-Day hirings wages advanced.

Dorset, Wiltshire, and Hampshire—The supply of labour is generally short, but the deficiency has been relieved by the release of soldiers for agricultural work in some districts

Surrey, Kent, and Sussex.—The supply continues to be deficient, skilled men being very scarce, but the situation has been relieved somewhat by the assistance given by the military Wages in some cases have been advanced

Essex, Hertford, and Middlesex—The supply of labour is deficient

North Wales.—The supply of labour is short, but with the help of soldiers the situation is not as serious as was anticipated

Mid Wales—The supply of labour continues to be very short, but some improvement is reported from the releasing of Army men for farm work.

South Wales—The help of soldiers has made the position much easier as regards labour, but the supply of labour is still deficient.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st April, 1917, certain diseases of animals existed in the countries specified :—

Austria (on the 21st February).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of December).—Anthrax Foot-and-Mouth Disease, Swine Erysipelas, Swine Fever.

France (for the period 18th February—3rd March).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-scab, Swine Erysipelas, Swine Fever.

Germany (for the period 15th—18th February).—Foot-and-Mouth Disease, Glanders and Farcy, Pleuro-pneumonia, Swine Fever.

Holland (month of February).—Anthrax, Foot-rot, Swine Erysipelas.

Hungary (on the 21st February).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (for the period 25th February—4th March).—Anthrax, Black-leg, Foot-and-Mouth Disease (707 outbreaks), Glanders and Farcy, Rabies, Sheep-scab, Sheep-pox, Swine Fever.

Norway (month of February).—Anthrax, Black-leg, Swine Fever.

Russia (month of September).—Anthrax, Cattle-plague, Foot-and-Mouth Disease (58,366 animals), Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine Fever.

Spain (month of September).—Anthrax, Black-leg, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Tuberculosis.

Sweden (month of February)—Anthrax, Black-leg, Swine Erysipelas, Swine Fever.

Switzerland (for the period 5th—11th March).—Black-leg, Foot-and-Mouth Disease (2 "étables" entailing 10 animals, of which 2 "étables" were declared infected during the period), Swine Fever.

No further returns have been received in respect of the following countries: Belgium, Bulgaria, Montenegro, Rumania, Serbia.

The Weather in England during March.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 3rd Mar.:								
England, N.E. ..	40·0	+0·9	0·04	1	—11	1	2·7	—0·2
England, E.	39·3	0·0	0·05	1	— 9	2	2·2	—0·7
Midland Counties ...	40·0	+0·5	0·11	3	— 9	2	1·7	—0·9
England, S.E. ...	40·0	—0·5	0·17	4	— 9	2	2·1	—1·0
England, N.W. ...	40·7	—0·9	0·17	4	—12	2	1·1	—1·7
England, S.W. ...	41·3	0·0	0·25	6	—14	3	1·1	—2·0
English Channel ...	43·8	—0·1	0·13	3	—13	2	2·9	—0·9
Week ending 10th Mar.:								
England, N.E. ...	30·9	— 8·8	0·73	19	+ 7	5	1·2	—2·1
England, E.	32·1	— 7·9	0·28	7	— 4	4	1·7	— 1·6
Midland Counties ..	31·4	—8·4	1·03	26	+14	5	1·4	—1·6
England, S.E. ...	34·6	—6·4	0·66	17	+ 3	5	2·0	—1·3
England, N.W. ...	32·3	—7·9	0·72	18	+ 1	4	1·5	—1·5
England, S.W. ...	36·6	—4·8	1·81	46	+25	6	2·4	—1·1
English Channel ...	41·1	—3·0	1·06	27	+ 8	6	2·0	—1·8
Week ending 17th Mar.:								
England, N.E. ...	39·6	—1·0	0·09	2	— 7	1	4·2	+0·2
England, E.	39·6	—1·4	0·71	8	+10	4	1·8	— 2·0
Midland Counties ...	40·4	—0.9	0·24	6	— 3	3	3·2	—0·3
England, S.E. ...	41·7	—0·5	0·60	15	+ 5	3	2·1	—1·7
England, N.W. ...	40·3	—1·2	0·26	7	— 6	2	4·5	+1·1
England, S W. ...	42·8	+0·1	0·67	17	+ 3	4	4·1	+0·3
English Channel ...	44·9	—0·3	0·58	15	+ 4	4	4·3	—0·6
Week ending 24th Mar.:								
England, N E. ...	38·8	—2·3	0·45	12	+ 2	5	3·9	—0·5
England, E.	37·7	—3.7	0·39	10	— 2	4	4·1	— 0·1
Midland Counties ...	38·3	—3·0	0·42	11	0	4	3·4	— 0·4
England, S.E. ...	38·3	—4·1	0·47	12	0	4	5·0	+0·7
England, N.W. ...	39·5	—2·1	0·48	12	— 1	4	4·5	+0·5
England, S.W. ...	39·2	—3·6	0·27	7	—10	4	5·8	+1·4
English Channel ...	41·3	—4·1	0·56	14	— 1	4	5·5	+0·6
Week ending 31st Mar.:								
England, N.E. ..	39·0	— 3·0	0·52	13	+ 3	6	4·5	+0·1
England, E.	37·7	—5·2	0·67	17	+ 9	6	3·3	—1·4
Midland Counties ...	38·4	—4·3	0·41	11	+ 1	5	3·7	—0·5
England, S.E.... ...	38·6	—5·4	0·51	13	+ 4	6	3·1	—1·8
England, N.W. ...	39·3	—3·2	0·96	25	+10	6	4·4	—0·1
England, S.W. ...	39·2	—4·8	0·60	15	0	5	5·1	+0·3
English Channel ...	41·5	—5·4	0·99	25	+13	6	4·3	—1·5

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in March and February, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	March.		February.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK :—	per stone.*	per stone.*	per stone.*	per stone.*
Cattle :—	s. d.	s. d.	s. d.	s. d.
Polled Scots	17 5	16 4	17 4	16 0
Herefords	16 9	15 7	16 7	15 2
Shorthorns	17 0	15 9	16 9	15 5
Devons	16 9	15 5	16 5	15 3
Welsh Runts	17 0	15 5	16 4	15 5
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	—	—	—	—
Sheep :—				
Downs	15¼	14	14½	13¼
Longwools	14¾	13½	14	12¾
Cheviots	16½	15½	15½	14
Blackfaced	15¼	14½	14½	13½
Welsh	15¼	13¾	14¼	13
Cross-breds	15½	14¼	14¾	13½
	per stone.*	per stone.*	per stone.*	per stone.*
Pigs :—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	15 10	15 0	14 11	14 1
Porkers	16 6	15 9	15 8	14 11
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	41 18	33 3	42 6	33 14
,, —Calvers ...	38 12	30 9	39 14	31 14
Other Breeds—In Milk ...	43 1	31 17	42 10	31 1
,, —Calvers ...	29 10	27 0	29 0	27 10
Calves for Rearing	3 10	2 15	3 8	2 14
Store Cattle :—				
Shorthorns—Yearlings ...	17 0	14 18	16 5	14 13
,, —Two-year-olds...	26 11	23 0	25 5	21 16
,, —Three-year-olds	34 9	28 10	32 11	27 15
Herefords —Two-year-olds...	29 2	23 9	30 9	23 1
Devons— ,,	30 18	25 16	27 12	22 17
Welsh Runts— ,,	25 19	22 14	24 1	20 7
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	73 9	62 3	66 5	57 3
Store Pigs :—				
8 to 12 weeks old	35 11	27 7	30 11	23 7
12 to 16 ,, ,, ...	60 7	47 6	53 3	41 6

* Estimated carcass weight.

AVERAGE PRICES OF DEAD MEAT at certain MARKETS in ENGLAND in March, 1917.

(Compiled from Reports received from the Board's Market Reporters).

Description.	Quality.	Birmingham.		Leeds.		Liverpool.		London.		Manchester.	
		per cwt.		per cwt.		per cwt.		per cwt.		per cwt.	
		s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
BEEF:—											
English	1st	118	0	118	6	—		119	6	120	0
	2nd	113	0	114	6	—		115	0	113	0
Cow and Bull	1st	109	6	112	0	106	6	108	0	107	6
	2nd	103	0	106	6	87	6	103	0	98	6
Irish: Port Killed	1st	—		116	6	116	0	117	0	116	6
	2nd	—		111	6	111	6	112	6	112	0
Argentine Frozen—											
Hind Quarters	1st	101	6	—		—		102	6	—	
Fore ,, ...	1st	—		—		—		93	6	—	
Argentine Chilled—											
Hind Quarters	1st	112	6	112	6	111	0	112	0	111	0
Fore ,, ...	1st	100	6	101	0	99	0	100	0	99	0
American Chilled—											
Hind Quarters	1st	—		—		—		116	6	—	
Fore ,, ...	1st	—		—		—		104	0	—	
VEAL:—											
British	1st	119	0	121	6	107	6	126	0	—	
	2nd	111	0	105	6	98	0	107	6	94	6
Foreign...	1st	—		—		—		—		—	
MUTTON:—											
Scotch	1st	129	6	130	6	141	0	135	6	144	6
	2nd	125	0	121	6	128	6	126	0	140	0
English...	1st	126	0	130	6	—		127	0	140	0
	2nd	121	6	121	6	—		118	0	132	0
Irish: Port Killed	1st	121	6	—		133	0	—		130	6
	2nd	112	0	—		122	6	—		123	6
Argentine Frozen	1st	106	6	—		106	0	108	0	104	6
New Zealand ,, ...	1st	86	6	—		88	0	87	6	88	0
Australian ,, ...	1st	86	6	—		—		—		—	
LAMB:—											
British	1st	142	6	—		—		140	0	—	
	2nd	136	6	—		—		130	6	—	
New Zealand	1st	100	6	—		98	0	98	0	98	0
Australian	1st	100	6	100	6	98	0	98	0	98	0
Argentine	1st	122	6	—		116	6	122	0	116	6
PORK:—											
British	1st	136	6	135	6	127	0	127	0	126	0
	2nd	130	6	123	6	118	6	113	0	116	6
Frozen	1st	101	6	106	0	98	6	101	0	105	0

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in March, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	26 6	25 6	—	—	24 0	23 0
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery —Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	196 0	—
Danish...	—	—	—	—	—	—
French...	—	—	—	—	217 6	212 0
Dutch	—	—	—	—	218 0	216 0
American	—	—	—	—	—	—
Australian	219 0	216 6	219 0	214 6	215 0	210 6
New Zealand	226 6	222 6	230 6	227 0	223 6	219 0
Argentine	—	—	215 6	213 0	210 0	205 0
CHEESE :—						
British—						
Cheddar	168 6	—	170 0	165 0	168 6	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	177 6	175 0	176 6	171 6
			per cwt.	per cwt.	per cwt.	per cwt.
Canadian	165 0	—	165 6	—	165 6	—
BACON :—						
Irish (Green)	145 0	—	145 6	143 0	141 6	138 0
Canadian (Green sides)	135 6	—	136 6	135 0	135 0	131 6
HAMS :—						
York (Dried or Smoked)	182 0	176 0	—	—	187 0	179 0
Irish (Dried or Smoked)	—	—	—	—	162 6	—
American (Green) (long cut)	124 0	121 6	126 6	122 0	128 0	125 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British...	—	—	—	—	20 5	18 9
Irish	19 10	—	19 10	18 9	19 4	18 6
Egyptian	13 4	13 1	13 7	12 3	14 4	13 6
POTATOES :—	per ton	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	—	—	—	—	220 0	—
Edward VII.	—	—	220 0	—	220 0	—
Up-to-Date	—	—	220 0	—	220 0	—
HAY :—						
Clover	—	—	150 0	140 0	141 6	133 6
Meadow	—	—	—	—	140 6	133 0

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1915, 1916 and 1917.

Weeks ended (in 1917).	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 6...	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
„ 13...	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
„ 20...	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
„ 27...	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb. 3...	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
„ 10...	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
„ 17...	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
„ 24...	56	0	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar. 3...	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
„ 10...	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
„ 17...	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
„ 24...	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
„ 31...	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl. 7...	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
„ 14...	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
„ 21...	56	5	55	3			31	5	52	10			30	11	31	8		
„ 28...	58	3	56	3			32	7	53	5			31	5	32	4		
May 5..	60	5	55	7			33	3	53	1			32	4	32	10		
„ 12...	61	7	55	5			34	0	53	5			32	5	33	1		
„ 19...	62	0	55	0			34	1	52	10			32	8	33	0		
„ 26...	61	11	54	7			34	8	52	9			32	7	33	4		
June 2...	61	9	53	3			35	4	53	9			32	5	33	3		
„ 9...	60	1	51	2			34	5	52	8			32	4	32	7		
„ 16...	56	1	48	10			34	3	50	9			31	9	32	1		
„ 23...	52	0	47	6			34	4	49	10			31	9	31	3		
„ 30...	49	5	46	3			35	3	49	1			31	1	30	10		
July 7...	50	1	46	3			34	7	45	6			31	6	30	8		
„ 14...	52	7	48	11			35	8	47	5			31	6	31	6		
„ 21...	53	10	51	6			35	10	48	8			32	1	32	3		
„ 28...	55	3	53	5			36	1	47	2			31	1	32	5		
Aug. 4...	55	4	55	1			35	7	46	1			31	5	32	9		
„ 11...	55	2	56	7			37	0	46	11			31	7	31	2		
„ 18...	54	3	58	1			39	4	48	0			31	4	30	8		
„ 25...	51	11	59	0			38	3	47	1			30	0	31	6		
Sept. 1...	45	3	59	4			38	1	48	5			26	10	30	5		
„ 8...	43	0	59	3			37	11	51	7			26	8	31	1		
„ 15...	42	9	59	11			39	0	52	6			26	4	30	9		
„ 22...	43	3	59	4			39	8	53	3			26	1	30	9		
„ 29...	43	5	58	10			40	4	54	1			26	5	31	1		
Oct. 6...	44	1	59	2			41	0	54	5			26	5	30	9		
„ 13...	45	9	59	7			42	3	53	10			27	1	31	6		
„ 20...	48	2	60	9			44	0	53	8			28	1	31	11		
„ 27...	50	3	62	10			46	2	54	6			29	1	32	10		
Nov. 3...	51	6	66	7			47	3	56	2			30	4	34	0		
„ 10...	52	8	69	8			47	5	58	0			30	11	35	8		
„ 17...	53	6	70	9			47	11	59	8			31	3	37	8		
„ 24...	54	2	70	8			48	7	61	8			31	1	39	7		
Dec. 1...	53	7	71	3			48	11	63	1			30	11	41	4		
„ 8...	52	10	72	1			47	10	65	6			30	4	44	1		
„ 15...	53	11	73	2			47	5	66	5			30	6	45	10		
„ 22...	53	10	74	8			47	2	67	3			30	7	46	5		
„ 29...	54	9	75	10			47	5	67	5			30	10	47	4		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

AVERAGE PRICES of **British Wheat, Barley, and Oats** at certain Markets during the Month of March, 1915, 1916, and 1917.

—	WHEAT.			BARLEY.			OATS.		
	1915.	1916.	1917.	1915.	1916.	1917.	1915.	1916.	1917.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London ...	56 5	57 0	81 2	33 0	53 11	66 1	32 6	32 8	52 3
Norwich ...	54 5	56 3	78 2	33 9	55 2	63 3	31 1	31 3	49 2
Peterborough	53 11	55 5	79 0	31 10	53 8	64 0	30 9	31 3	49 4
Lincoln ...	55 3	57 5	81 1	30 11	54 0	65 1	30 5	31 9	50 1
Doncaster ...	53 4	57 9	79 7	30 8	52 9	65 4	29 7	31 5	49 11
Salisbury ...	53 4	56 11	78 7	33 11	53 8	64 6	33 4	31 0	48 8

Statement showing the average price of British corn, per quarter (Imperial measure) for the quarter ending Lady-Day, 1917, pursuant to the Corn Returns Act, 1882.

Wheat.		*Barley.*		*Oats.*
s. d.		*s. d.*		*s. d.*
77 2	....	64 11	....	48 2

NOTICES OF BOOKS.

Heather and Moor Burning for Grouse and Sheep.—(*Oliver and Boyd, Edinburgh, 2s. 6d.* net., postage 2½*d.*).—The need for increased food production at home has had the effect of giving the problem of heather burning more than usual prominence. This little book by Professor Robert Wallace deals with Scottish conditions and takes it as axiomatic that "the interests of grouse and sheep are identical, the object being so to manage moorland as to secure the greatest amount of vigorous growing heather, without decreasing the other useful food-plants associated with it, and thereby maintain the maximum amount of food for both sections of stock." Common heather, its rivals in moorland floras, the food of grouse, general observations on heather burning, the establishment of a burning rotation on neglected moors, and evidence of good results from treatment, form the headings of successive chapters. The volume is well illustrated. Purchasers may like to know that profits from the sale of the volume will be devoted to the funds of the Red Cross Society.

Plants Poisonous to Live Stock.—(*Cambridge University Press,* 6*s.* net.)—This volume, the second of the Cambridge Agricultural Monographs, by Harold C. Long, brings together information as to the poisoning of live stock by plants, from sources which have not hitherto been readily accessible. The plan adopted throughout with each plant is to discuss firstly the extent to which it is poisonous, the parts which are poisonous, and the quantities which must be eaten to cause illness; next to give the results of investigations into the toxic principle and the method of rendering it harmless; and finally to survey the symptoms which have been observed in cases of poisoning. There are also chapters dealing with plants suspected of being poisonous, the effects of plants on milk, mechanical injury, and the classification of poisons. A list of 267 references to the literature on poisonous plants concludes the volume, which contains a complete index.

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(*From the Returns of the Board of Agriculture and Fisheries.*)

DISEASE.	MARCH.		THREE MONTHS ENDED MARCH	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	63	66	180	168
Animals attacked	80	83	211	201
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	24
Glanders (including Farcy):				
Outbreaks...	3	6	8	19
Animals attacked	5	18	14	58
Parasitic Mange:—				
Outbreaks	338	277	1,015	1,001
Animals attacked	706	620	2,151	2,474
Sheep-Scab.—				
Outbreaks	70	22	322	149
Swine Fever:—				
Outbreaks	244	471	553	1,078
Swine Slaughtered as diseased or exposed to infection	93	1,442	196	3,376

IRELAND.

(*From the Returns of the Department of Agriculture and Technical Instruction for Ireland.*)

DISEASE.	MARCH.		THREE MONTHS ENDED MARCH	
	1917	1916.	1917.	1916.
Anthrax:—				
Outbreaks	—	—	2	1
Animals attacked	—	—	2	5
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	—
Parasitic Mange:—				
Outbreaks	6	5	13	22
Sheep-Scab:—				
Outbreaks	30	36	154	165
Swine Fever:—				
Outbreaks	24	22	55	53
Swine Slaughtered as diseased or exposed to infection	145	179	344	264

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HAY-MAKING MACHINERY.

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Agricultural Organiser for Derbyshire.

The various processes and operations through which the grass is passed in its conversion into stacked hay may be grouped under two headings, and it is convenient to deal with the implements concerned under the same titles :—

(*a*) *Making* processes : those performed with the object of converting green herbage into hay.

(*b*) *Carrying* operations : those securing the hay in the stack or barn.

Weather conditions largely determine the success of the work, and the amount of labour necessary to secure the crop ; and, admittedly, a good spell of fine weather is more appreciated by the farmer than any machine or labour-saving device—or supplementary labour. At the same time the possession of a set of modern hay-making appliances enables him to make rapid progress during periods of favourable weather, and while reducing hand labour to the minimum, largely prevents waste of crop by exposure.

Appliances for Making Hay.—Good hay cuts up green, waxy and sweet, with the leaf and seed fully preserved. Apart from the amount of moisture present at the stacking stage, the important factors determining the above qualities are the amount of rain and sun-burning to which the crop has been subjected after cutting.

The process of hay-making is not simply one of physical drying ; the machines used in the work indirectly affect the quality of the finished product, through the manner in which their action influences leaf-transpiration. When the leaves of mown grass are early shrivelled up by over-exposure to the sun they cease to draw moisture from the stems, and the necessary further drying of the latter is accompanied by loss of colour and probably of nutritive value. This cutting off of the moisture outlets which lengthens the process of drying leads to over-heating of stacks in good seasons; and the principle here involved supports the growing preference for machines which make hay by aeration rather than by sun-drying.

Each of the machines used in hay-making—swath turners, tedders, side-rakes and dump-rakes—has its own special advantages, and on a large farm it may be economical to have the complete set. The average farmer, however, must study his equipment as a whole, and in making an addition select that which under his special conditions best accompanies the tools he already possesses. This article will probably be of most service where it affords such guidance.

1. *Swath Turners.*—The passing of the mower and team over the swath compresses it, and, while that is the condition in which it can best turn rain, it should be turned over on to the bare stubble as soon as the latter is dry—provided there is no reason to expect interruption in the further stages of making and securing the crop. The tedder is not an ideal machine for this purpose, as it spreads the grass over the damp as well as the dry ground and exposes too large a surface of the crop to the sun. The swath turner is superior in these respects; and, besides handling the crop more gently—which is very important with clover—it completely inverts the swath, leaving it light and open to the air.

After the first operation with the swath turner, the swath is sufficiently intact to offer some resistance to untimely rain, though that advantage cannot be claimed after a second turning. Repeated workings with this machine, however, soon effect the desired drying of the crop, even in the absence of bright sunshine. The satisfactory making of the crop in more or less intact swaths is not, however, always practicable; and under the exceptional circumstances to be here mentioned some form of tedder is almost indispensable · it is when swaths are very large, and perhaps have been wetted through by rain, that they have to be opened out to allow of the drying of the insides and to prevent them from rotting.

Most makes of swath turner are adaptable to different widths of swath and will work satisfactorily on ridge and furrow land. There are right- and left-hand patterns, and makes in which the direction of rotation of the turners is reversible. The latter are useful, in the absence of a side-delivery rake, for putting up two to four swaths into a windrow; while they have the obvious advantage of following equally well either left- or right-hand mowers.

2. *The Side-delivery Rake.*—The usefulness of a machine working on the side-delivery principle was anticipated by the judges of the Royal Agricultural Society of England trials of haymakers at Darlington in 1895. They reported: "We . . . were much disappointed at not finding any new machine entered for putting hay and clover out of swath into windrow; there is a great want of a machine for this purpose arranged . . . to work backwards and forwards, putting, say, eight rows into one."

This comparatively recent invention is well on the way to becoming the most popular of all hay-making appliances. Its use is for air-drying the crop in small, light windrows; and it leaves little to be done by either the dump-rake or the tedder. In very good drying weather, and more frequently in the case of light crops, it is the only implement used between mowing and carting, but, as a rule, it is brought into operation only after a certain amount of work has been done with the swath turner or the tedder.

The side-rake collects over the width of two swaths and delivers the hay sideways in a straight, continuous and regular windrow, which is in an ideal state of lightness for aeration. The number of swaths first put together varies from two to five, according to the weight and condition of the crop. The row is then repeatedly moved over on to fresh ground until the hay is fit to cock or carry, the final size and position of the rows being arranged for convenience in loading. In this work the horse need never walk on the row; and the advantage of facility in rolling rows over on to fresh ground is greatly appreciated when an untimely shower is followed by good drying conditions.

This implement is much handier to work than the dump-rake, being light in draught and involving little effort on the part of the operator. It rakes clean but does not collect bottom rubbish; and the windrow made by it is not only light and free from any tendency to "pack" but is much more convenient for cocking or loading. Where a mechanical loader is used the side-rake is almost indispensable.

The use of the side-rake reduces the function of the dump-rake to that of cleaning up after carrying, for which purpose the expanding type is, under suitable conditions, a saver of much time and labour.

Of the three patterns of side-rakes, those in which the rakes are suspended in front of the main axle (and in full view of the driver) are the handiest and the most successful in collecting on ridge and furrow land. An improved method of suspension of the rakes has, however, been recently devised, which should complete the success of the type having the rakes behind the axle.

3. *Combined Hay-makers.*—During recent years several makers have produced machines which combine more or less satisfactorily the functions of the swath turner and the tedder with those of the side-delivery rake. They consist of a side-rake with the rakes placed behind and obliquely to the main axle, and provided with reversing gear. When the rakes move in the forward direction they make a windrow or roll it over on to fresh ground, as above described; when they move in the reverse direction they turn two swaths or ted a windrow out.

The combined hay-maker is a boon to many farmers who have to consider not only the cost of the separate implements, but also the necessary shedding-room, while moving a lever is obviously simpler and quicker than changing the machine behind a horse Given a reasonably uniform surface and ordinary crops to work upon, this machine leaves little to be desired in performing any of its three functions. It is primarily a side-rake, but it will also ted a windrow out very satisfactorily; and in opening out heavy swaths it does excellent work, when the rakes are set to flick off the top halves. As a swath turner, however, it is less efficient, as it does not invert the swaths in the same way as an ordinary swath turner, particularly when rain-beaten or "grown-through" crops are being dealt with.

Certain disadvantages apply to most combined hay-makers. Their width has been found a serious drawback in districts where gateways and lanes are narrow; the draught when the machine is in reverse gear is heavy—too heavy, in fact, for work on steep gradients; while the angular setting and method of suspension of the rakes affect the utility or the efficiency of the implement on ridge and furrow land. The last failing is already remedied in one make. In previous types the working level of the tines is adjustable at the rear end only; but in a recently-patented make both ends of the rake system are adjustable by hand levers. Moreover, spring supports are provided, and either end will rise automatically in the event of the tines striking an obstacle.

The defects of the ordinary reversible side-rake in its swath-turning capacity have led to attempts by a number of makers to overcome them by the use of detachable sections in the rakes, in order that the swath-turning operation may be done in the forward direction. This enables the tines better to run under the swath ; and, the speed being slower, the crop is handled more gently, and the draught is not increased. An improved machine of this type was awarded a silver medal by the Royal Agricultural Society of England at their Nottingham Exhibition in 1915. It was reported upon in their Journal for that year as follows : " In this machine extreme simplicity and lightness with a low selling price have been achieved, together with efficiency in work, but at the cost of some adaptability . . .

" The improvement consists in bridging the rake-bars in their central portion, *i.e.*, in the portion of the rake to be omitted when it is to be used as a swath turner, and having loose make-up pieces of rake easily inserted and fixed by a single bolt when used for side-raking. The arching keeps the bars out of the way of the swath when turning . .

" The portions used for swath-turning are at a constant distance apart, hence a lack of adaptability which demands that for satisfactory work the machine should follow a mower cutting a certain width of swath."

4. *Tedders.*—There are three types of tedding-machine, in addition to the combined hay-maker, which can perform this function. The oldest and most familiar type is the hooded rotary machine with both forward and back action ; the second has a back-kicking action not unlike that of a hand fork, and is known as the Anglo-American Tedder, or as the kicker ; the latest is a rotary machine with back-raking action.

The double-action rotary machine is numerically the most important of hay-makers, and occupies a place difficult to fill. It will work satisfactorily on a ridge and furrow surface, and will either scatter grass out of swath or shake up hay that is in windrow. The overhead action is the more effective in moving the whole of the crop, but it subjects the hay to very rough treatment, and the draught is heavy. It is recognised to be unsuitable for making " seeds " hay ; and on any crop it is apt to thresh out the finer (and more nutritious) parts and to destroy the weather-proof wax coating of the stems. In some patterns of this machine there is a tendency for hay to fall down on and wrap round the fork axle when the horse stops or turns at the end of the field; this is overcome by an improvement which allows the forks to continue revolving after the road wheels come to rest.

The kicker has the advantage of treating the crops more gently, and is known to be suitable for making clover crops. The general utility of most makes, however, is limited by their inability to work on ridge and furrow, except in tedding suitably-placed windrows, which operation they perform very well. A tedder used in Derbyshire, however, possesses an improvement which enables it to ted both swaths and windrows on uneven land; the improvement consists in a divided frame, the level of each half of which is controlled by a small wheel running vertically under the fork crankshaft.

The new rotary tedder was exhibited at Nottingham Royal Show in 1915, where it received the award of a silver medal. Such experience of the use of this machine as is available supports the impression which its construction gives—that it it is a good general purpose hay-maker and will occupy in the future the position now held by the hooded tedder. It is light in draught, capable of good work on uneven surfaces, and handles the crop very gently, leaving it light and open.

5. *Hay Collectors.*—Prior to the introduction of the side-rake, hay was generally made while broadcast, and, when ready to lead, raked together into large cart rows with the dump-rake. In modern practice, making and gathering proceed almost simultaneously.

In certain districts commonly, and in others occasionally, it is necessary to interpose an intermediate stage between rowing and carting, that is, to put the hay into cocks of various sizes and for different lengths of time according to circumstances. In Scotland, Ireland, and the northern counties of England, the cocks or pykes are finally about cart-load size, and remain in the field some three or more weeks. This allows hay-making to proceed without the interruption of carting, and attention to be given to other pressing needs of the farm, as for instance, work among root crops. In other districts cocking is done only when partly-made hay would otherwise suffer injury from rain or dew before it was ready to stack; or when making proceeds faster than carting, and there is likelihood of the hay being over made, or being left exposed to night dews and rains. In the case of crops like lucerne and clover, the leaves of which are very readily lost when much exposed to the sun after cutting, cocking may advantageously be done on principle; the flow of sap from stem to leaf continues while the crop is in cock, and when the cocks are opened out complete making is soon effected; thus the stems are cured simultaneously with the leaves.

Owing to the amount of hand labour involved, cocking is frequently either entirely omitted when it ought to be done, or performed in such a manner as to be worse than useless. The possession of an up-to-date set of carrying appliances minimises its necessity, but it is desirable to call attention to certain implements available for the purpose of putting hay into cock.

(*a*) The side-delivery rake has by a recent invention been fitted with a device consisting of long-curved tines similar to those of a horse rake, which collect the hay as it is delivered by the revolving rakes. When sufficient has been gathered to form a cock, the operator presses a foot lever, which causes the collecting tines to rise and deposit their load.

(*b*) In America a pattern of side-rake is used which delivers sideways by means of an endless band or apron. This is driven through a clutch, by the operation of which the hay may be deposited in heaps.

Two simple and cheap tools, known as slide-rakes or hay-collectors, are widely used in the northern and western parts cf the kingdom :—

(*c*) The tumbler rake, which has teeth on both sides of the beam, is sufficiently known to require no further description.

(*d*) The hay-collector (fig. 1) has teeth on one side only of the beam, which is provided with rigid curved handles. It consists essentially of six pointed wooden teeth a yard or so in length and some 15 in. apart, and is drawn by one horse with long chains attached to the ends of the beam. A patented device enables the implement to deposit its load by turning over and to right itself automatically by a second turning. This cheap, little tool is very serviceable in the hands of a capable operator for rapidly collecting hay out of windrow or lap cock into larger heaps which require little trimming to turn rain; and by collecting large loads from both directions field ricks or pykes can quickly be made.

Appliances for Carrying Hay.—An important difference between making and carrying processes is that, whereas making cannot be accelerated beyond certain limits without injuring the hay or danger to the stack, carrying may proceed at the fastest possible rate as soon as the hay is ready. A complete set of appliances which expedite leading operations should therefore lessen the temptation to commence stacking too soon. and reduce the risks of over making and weather injury attributable to delay in carting.

Unfortunately for farmers with limited labour resources, housing appliances require to work in conjunction with each other, and a complete set cannot be operated to real advantage with fewer than about six men and five horses. This difficulty, however, is superable by working co-operatively.

6. *Hay Sweeps.*—Where hay is stacked in the field, this implement, used in conjunction with either an elevator or a horse fork, is invaluable for expeditious carrying. Seven men and four horses with two sweeps and an engine-driven elevator will clear an average crop of hay off 20 acres of land in a day, where half that area would be their normal capacity with wagons and pitchforks.

The standard type of hay sweep used in England has twelve metal-pointed wooden teeth, 10 ft. long and about 15 in. apart. The main frame runs on two outside wheels, and there is a rear-carriage (supported by a swivel wheel) which bears the driver's seat and the device for raising and dropping the tines. Two horses are yoked, one at each side of the implement, and as they draw it along, it scoops up the hay out of cock or windrow. When full—and, if properly manipulated, it carries about half a wagon load—the teeth are raised and the load is run to the stack, where it is unloaded by simply dropping the teeth and backing the horses. The hay sweep works best on level land, though ordinary ridge and furrow is not prohibitive. It can be folded up to pass through gateways when empty, but its working width usually prevents its use for leading crops home; and obviously it cannot be used in fields which are too small for separate stacks. On the other hand, the practice of out-stacking is coming into favour where fields are of suitable size, and where stock can be out-wintered. Stacking in the field saves labour at a busy time, but involves additional work in winter if the hay has to be brought home as required. It has been found, however, that hay is used less wastefully when that has to be done.

The sweep-rake can also be used in corn harvesting.

In addition to the implement commonly known as the hay sweep or sweep-rake there are smaller and simpler tools used for the same purpose. These are either without wheels and depend for their transport entirely upon the slippery nature of hay stubble, or have wheels which carry only part of the weight of the load. Two implements of this kind are widely used in districts where hay is tramp coiled; (1) the hay-collector already described; and (2) an improved pattern

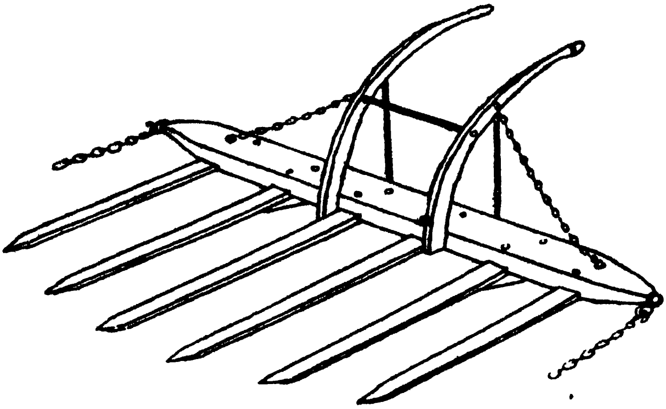

FIG. 1—Hay Collector

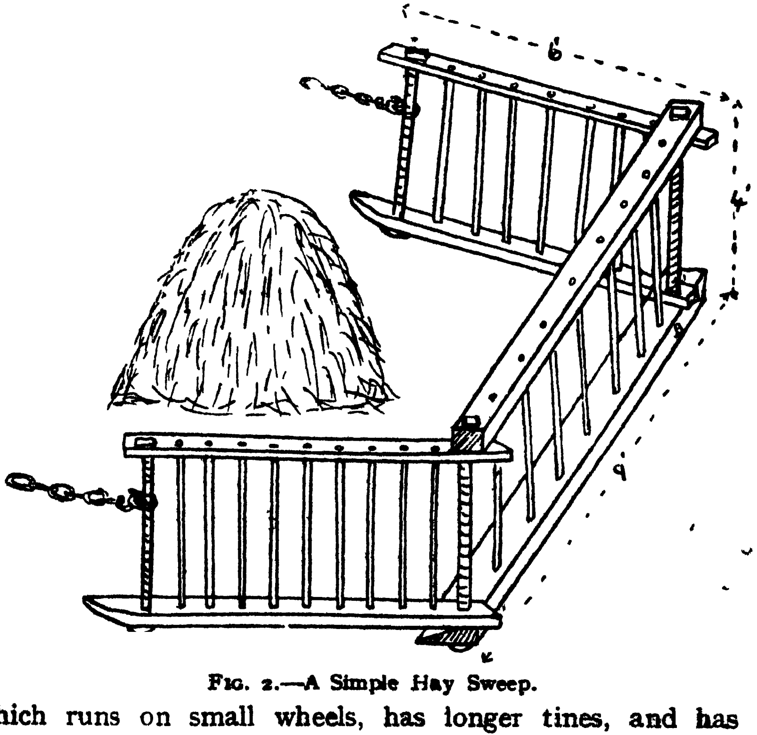

FIG. 2.—A Simple Hay Sweep.

which runs on small wheels, has longer tines, and has a collecting rack behind the beam. Both are very useful where stacks are being built in the field. Being one-horse tools, there is a limit to their carrying distance; and their use is most practicable for clearing the first 5 to 10 acres, respectively, nearest the stack. As there is no folding up for passing through gateways, no time is lost in commencing work. Smaller farmers will find hay-collectors meet their requirements better than sweep-rakes; and it must be mentioned that 20 acres is the maximum area over which the ordinary wheeled sweep is normally workable, though probably the use of shafts instead of poles extends that limit.

In some districts simple appliances have been devised by farmers to obviate loading on to vehicles when stacking in the field. One such is here illustrated which can be constructed by any local carpenter at a cost of about £3 (fig. 2). Two horses are yoked, one to each side of the implement, and coupled about six yards apart. The driver stands on the bottom bar of the sweep, which slides along the ground and pushes the load in front of it. To unload, one horse is unhooked and the other draws the implement away, held upright by the driver. This tool will collect out of windrow and very well out of large cocks; in fact, it is desirable to break the windrow up roughly into small heaps for efficient sweeping with this implement.

Hay-loaders.—In districts where hay is led out of windrow the need is felt for a machine that economises time in loading and abolishes the heavy work of hand pitching. The machine designed for this purpose is of American origin and has in recent years been adopted by many southern and midland farmers, while British engineers are devoting their attention to its improvement.

The hay-loader attaches behind a cart or wagon, and as the combination is drawn along it rakes up the hay and elevates it on to the vehicle. An additional horse and a driver are necessary, and two men are required to spread the hay on the load. A large load is put up in about 15 minutes. For safety and to simplify the work of the spreaders a light rope and stake frame-work is fitted round the vehicle. Where gormers are used, however, side holders only are required, and these can be fitted to sag outwards, whereby a lower and wider load can be built.

For satisfactory and expeditious working of the hay-loader, the side-rake and the horse-fork must, as a rule, be used in conjunction with it. The first is necessary to make regular and straight windrows; while the latter is required to unload rapidly in order to keep the loader going, and desirable because of the difficulty of pitch-forking hay that has been spread out on the load.

The loader is best suited to large farms with large, level fields. Owing to the length of the combination it requires considerable turning room; and where hedges are high there is an objection to clearing the headlands first. The draught of the combination is too heavy for a pair of horses when loading up hill; and there are difficulties in working on land

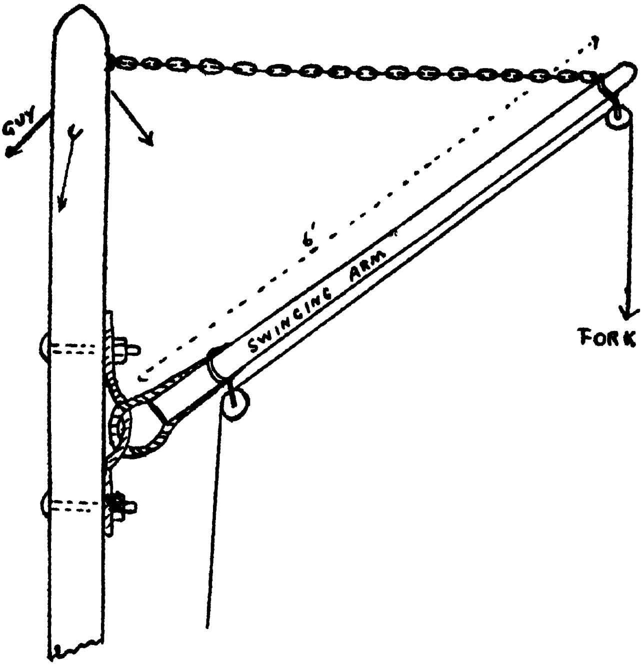

Fig. 3.—A Simple Jib.

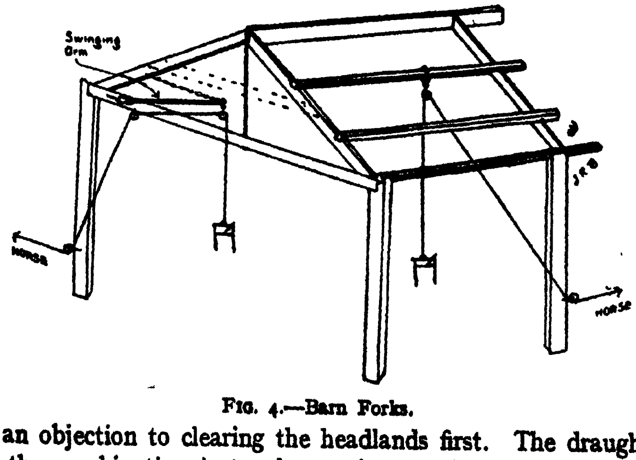

Fig. 4.—Barn Forks.

laid up in ridge and furrow. Windy days are also troublesome to users of the hay-loader. Moreover, it is obviously of little assistance when hay must be cocked, except in that its use may enable the farmer to house hay that would otherwise have to be so secured.

There are two main types of hay-loader :—

(1) The "shaker" is the older type, and consists of an inclined plane up which the hay is pushed by means of a series of oscillating bars with tines projecting from their under side. The rake-bars extend down to the ground at the rear, where small castor wheels support the frame and enable the machine to follow inequalities in the surface. At the upper end of the plane is a platform on to which the hay is delivered, whence it is pushed on to the load by the rake-bars or taken away by the men spreading. This type of machine is now receiving the attention of British makers. It is simple in construction, has positive elevation, and it does not call for special skill in its manipulation, as there are no spiked drums around which the hay may wind. It has, however, the disadvantage of handling the hay rather roughly, and is, therefore, not an ideal machine for loading "seeds" and clover hay.

(2) In the second type of loader the hay is gathered by one or more spiked drums and carried up the inclined plane by means of an endless band made of ropes and slats. There are three varieties of this pattern which differ chiefly in the method by which the hay is gathered and placed upon the elevating apron. In the latest type the hay is separately collected and transferred to the elevating band. This particular machine has further improvements which would appear to correct some of the defects of the apron type; the frame has wind screens at the sides and upper end, the elevating slats carry prongs, and the inclination of the frame has a considerable range of adjustment. The apron type of loader has the advantage of treating the hay more gently, but with the makes hitherto used it has been necessary to take precautions in working to prevent wrapping of hay round the collecting-drums, one such precaution being to clear the hay from the headlands first, in order that the machine may finish and stop with the drums empty.

Horse-fork or Unloader.—Unloading by hand is, perhaps, the most laborious of the whole series of hay-making operations. It is at the stack where delay is most frequent, owing to the absence of unloading devices, and it is obviously disproportionate to adopt sweeps or loaders unless provision is made for correspondingly expeditious unloading. On the large farm, and certainly where corn is grown, the travelling web elevator is desirable. It can be used for stacking under barns as well as in the open; it can be driven by a small petrol engine; and patterns are available of less cumbersome and expensive type than the full-sized machine. There are, however, many farmers whose means and requirements are best suited by the horse-fork or unloader, which is by general assent of users a great saver of time and heavy work at the stack. By means of the horse-fork a youth can easily send up a wagon load of hay in about 15 minutes. It is best suited for stacks holding about 20 tons, and for expeditious working two stackers are required, with a youth to work the fork and a boy or woman to drive the horse.

The fork part of this implement is made in a variety of shapes, each of which has its advantages. The double harpoon type is probably the best, except for dealing with very short hay. A pattern recently patented, however, but apparently not as yet placed upon the market, would appear to work on a desirable principle; it consists of a corkscrew-like device with side-spears, to unload which the operator, by pulling the releasing rope, causes the screw to unwind and spread the hay about instead of dumping it.

The elevating part of the unloader at present in common use is one or other of the following types :—

(1) *Long Pole.*—A high, strong pole is fixed in the ground and secured in the upright position by three or four guy ropes. A swinging crane-jib is suspended from the top to facilitate the deposition of the loads in different parts of the stack. This type is applicable only for stacking in the open, and the hoisting of the pole is a difficult operation.

(2) *Long Jib.*—There is a short standard, supported by two guy posts, and a long, swinging jib which can be set at any angle to the standard. This pattern, which is of recent introduction, is suitable for unloading into Dutch barns as well as for building stacks. It is more easily erected and moved than (1).

(3) *Carrier.*—A rail is fixed along the roof of the barn, and a carrier with pulleys runs backwards and forwards on this. The barn has to be of suitable construction.

The arrangement of a home-made unloading device is within the skill of many farmers. In some cases the elevating part of the outfit consists merely of a long pole with a pulley near the ground and another at the top. It may be inclined towards the stack, or a locally-made jib may be fitted, as shown in the diagram (Fig. 3). When a hay barn has sufficiently strong purlins, all that is necessary is a simple pulley hooked on to a purlin, and another attached to an upright. Another arrangement is to attach a swinging jib on to the tie beams, as illustrated (Fig. 4). In the case of barns of light construction, and where the horse-fork specially made for unloading into such is not available, a workable outfit may be arranged with a short pole standing under the eaves to which is attached the short swinging jib.

ANNUAL REPORT OF THE HORTICULTURE BRANCH FOR THE YEAR 1916.*

THE conditions under which English horticulture has been carried on during the past twelve months have been exceptionally difficult. The disorganisation of ordinary civil life caused by the War and the general interruption of trade, the high price and scarcity of many articles, coupled with the irregularity of the railway and postal service, have proved serious impediments. The shortage of labour, many growers having lost 80 and even 90 per cent. of their staff, including often skilled hands who cannot be replaced, has made good cultivation practically impossible. In addition to these troubles, growers experienced one of the very worst seasons ever known. The early frosts of the autumn of 1915 were succeeded by an unusually mild winter, and in January all growth was abnormally early. Heavy rains fell in February and March, changing to snow at the end of the month, and the bad weather culminated in a violent storm which was one of the worst known for many years. Rain continued during April and part of May. The weather during blooming period was most unfavourable and so continued with short intervals for most of the rest of the year, while the temperature, especially at night, was generally low. Finally, a severe infestation of the larvæ of the winter moth, the tortrix moth, and certain other insect pests, caused serious losses among apple and pear growers in the south of England and the Midlands.

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* This article replaces the usual Annual Report of the Horticulture Branch, which is not issued separately during the War.

In spite of these highly adverse circumstances, the general condition of English horticulture proved much better than might have been expected. The export trade in nursery stock and bulbs continued at a satisfactory level, and the Inspectors report that the great commercial nurseries remain singularly free from injurious pests—an opinion which is amply confirmed by the reports received from the United States Federal Board of Horticulture on the nursery stock imported from England. The crops of some fruits, moreover, were heavy and the prices good, especially in the case of gooseberries, which were in great demand. Plums were irregular, being a heavy crop in some places and a failure in others. Prices were generally not unremunerative, though much fruit of all kinds was wasted owing to the rain and the difficulty of gathering.

Another trouble which threatened to make fruit growing unprofitable was the threatened deficiency in the supplies of sugar for preserving purposes. Early in 1916 the Royal Commission on the sugar supplies announced publicly that, owing to the impossibility of obtaining the full supply of sugar for all purposes, consumers would only be able to obtain during the current year three-quarters of the quantity of sugar obtained in 1915. Considerable alarm was at once felt by commercial fruit growers, especially those who depended upon the commercial jam makers for their sales, and representations were made to the Board on the subject. A conference was held and the Sugar Commission were able to announce that, in view of the importance of saving the fruit crop and the value of jam as an article of food, commercial jam makers would be able to get their normal supplies of sugar as in 1915, provided that it was used in the preservation of home-grown fruit. This decision had the effect of affording an outlet for the small fruit, but as only three-quarters of the sugar could be supplied at once it involved the putting down in the form of pulp of large quantities of plums and apples. Private jam makers, who did not benefit by this arrangement, moreover, were severely handicapped. Not only was sugar at a price which made private jam making expensive, but in many places sugar was almost unobtainable, so that the quantity of home-made preserves prepared during the year was undoubtedly much reduced. There is no means of ascertaining with any degree of accuracy what the amount of fruit is which is made into jam in private families every year, and opinions obtained from different sources differ very widely. It may, however, be conjectured that it is not less than 7,000 tons, yielding perhaps 15,000 tons of jam. Much of this will, of course, be commercially-grown fruit, bought by those who prefer home-made jam but cannot grow their fruit themselves, but much is also the product of private gardens.

As it seemed unfortunate that at the present crisis so large an amount of food should be wasted, and as there was some evidence that the plum crop would be large in some places at any rate, though there was a short crop in others, an effort was made to popularise the use of glucose, sold under the name of Corn Syrup, as a partial substitute for sugar. Experiments in making jam with liquid and solid glucose in varying proportions were accordingly made, and after it had been ascertained that the best proportion appears to be 33 per cent. of glucose to 67 per cent. of sugar as the preserving medium, a memorandum was prepared appealing to the public who make jam at home to use this article and to make a strong effort to utilise the plum crop. Glucose, as is well known, is extensively used in confectionery, and in the preparation of many articles of food; it is also used in medicine. Expert advice was taken as to whether it could be safely recommended for private jam-makers, and the manufacturers and principal importers were approached to ascertain the price at which it could be put on the market in large and in small quantities. All the firms communicated with undertook to put it up in tins containing 7 lb. or 14 lb. weight, or in casks of 1 cwt. or 5 cwt. The memorandum, which gave general directions for making jam, was circulated to the Press, and through the War Agricultural Committees, and as it contained an offer to supply the names and addresses of the principal manufacturers and importers, led to a large correspondence. It is interesting to note that most of the correspondents wrote from town addresses, indicating that even if the bulk of home-made jam is not prepared in urban centres, at any rate a considerable proportion is made there— and that by families who are unwilling to forgo their customary home-made preserves. Manufacturers of Corn Syrup state that they have received many orders for tins containing small quantities, showing that the advice given by the Board has been followed in many instances.]

The Board's Committee for the preservation of fruit and vegetables with which the Horticulture Branch is directly associated have conducted a number of trials in drying vegetables, the manufactured articles being supplied to the Army at the front. A large number of problems have been encountered and in the majority of cases successfully solved, and a great mass of valuable information collected which, when properly tabulated, will be found useful should there be any prospect of an industry being permanently established. The data, however, at present appear to indicate that dried vegetables are not likely to replace fresh vegetables in ordinary commerce in normal times, and that the work cannot be economically carried on except under factory conditions. Experiments in the preservation of certain fruits have been undertaken especially in connection with the plum crop, which, as is well known, is often difficult to harvest. In some years, large quantities of plums are left uncollected and unmarketed, and any means which can be devised for utilising the surplus in years of glut would be to the national advantage. The comparatively short period during which the plum season lasts, the difficulty of transport, and the difficulty of gathering the crop if abundant, as well as the limited uses to which plums can be put, make it a matter of great importance that any proposal to deal with this fruit should contemplate the disposal of a large quantity of material in a very short time. The object, therefore, of the inquiry has been the discovery of some method whereby this end can be achieved in the most economical way possible. The preliminary results attained have been successful, but owing to the peculiar circumstances attending the past season, it is not considered advisable to express any definite opinion of the practicability of the method on a large scale.

In former years a good deal of the time of one of the Board's Inspectors was devoted to the study of the pollination difficulties attending certain varieties of apples, pears, plums and apples, and much information has been collected as to the varieties which appear to be the most suitable "mate" for each other. Several experimental plantings have been made by growers on the suggestion of the Inspector and many visits have been paid by him to the orchards of commercial and private fruit growers in order to give advice on this and kindred questions. The investigation as to the varieties best suited for planting and proximity to each other has been continued this year, but the unfavourable season of last spring made accurate observation very difficult, and the additional information collected in 1916 was almost nil. A great deal of correspondence on cultural questions took place, both officially and semi-officially, with many growers; it was chiefly of a private nature, and of no interest to the public, though it is hoped of value to the correspondents.

Diseases of Plants.—The reduction in the Board's staff of Inspectors since the beginning of the War, the release of several members of the old trained staff for military service, and the substitution of new officers ineligible for the Army, has led to the necessity for confining the attention of the outdoor staff chiefly to the more important plant diseases, to the exclusion of many questions of less immediate urgency. The administration of certain Orders of the Board has been kept up as far as possible, and when opportunity afforded, inquiries and investigations into minor diseases have been followed up, but in the latter cases only in so far as the more important duties of the staff were not interfered with. The allocation of duties under these circumstances has not been an easy task. It has been possible, however, for three reasons:—

(1) The reformed system of inspection introduced in 1913, whereby the Local Authorities have been relieved of the duty of appointing Inspectors, and the Board have undertaken the greater part of the work, has made the distribution of the inspectorate in those parts of the country where they are most needed at any time a possibility, thereby securing increased efficiency without extra cost, and uniformity of method in the place of disconcerted action;

(2) The valuable assistance rendered by voluntary workers in many places, including the county police, borough, sanitary, and market inspectors, and secretaries of allotment societies, has relieved the Board of a good deal of labour; and

(3) The decline, probably temporary only, of the virulence of certain infectious plant diseases.

The last advantage has to a certain extent been counterbalanced by the increase in the spread of other diseases due to the weather and other circumstances which are beyond control.

American Gooseberry Mildew.—The epidemic of American Gooseberry Mildew which threatened some years ago to make the culture of gooseberries in England unprofitable if not impossible, has again declined. In spite of the difficulty experienced by many growers in getting labour for the necessary "tipping" of diseased bushes, many plantations were carefully attended to by their owners, though the work was carried out at a later season than is desirable. Very few tipping notices were issued in 1915, and none were sent out in 1916, though a printed circular letter was sent to every occupier of infected premises urging the completion of the work at as early a date as possible. It is satisfactory to know that the advice was taken in many instances by growers who have at last realised the advantages of the plan advocated by the Board. Whether the improved condition of the gardens can be wholly ascribed to the tipping carried out last year, and in previous years, it is of course impossible to say with certainty, but it is an understood fact that those growers who have consistently followed the Board's advice have in many cases begun to reap their reward, while those who neglected the work or depended on a more or less perfunctory spraying have suffered severe loss. By universal admission the quantity of diseased fruit sent to market has very much diminished, especially in London, where, however, it was found necessary to prosecute in a few cases, and reports received from the Inspectors show that this improvement was due mainly to a general reduction in the intensity of the disease. In Worcestershire especially, where the American Gooseberry Mildew Order has always been vigorously enforced by the Local Authority, the disease is now far less prevalent than formerly, and several gardens have recently been officially declared free from disease which have been under inspection for the last six or seven years. The reports from Devonshire and Cornwall also show that many gardens remained free from mildew in 1916, though disease was present in 1915. The only district where disease appears to be spreading is the Eastern Counties and a few places in the South where the infection has spread to private gardens. In many of these cases the owners have destroyed their affected bushes, so that it is hoped the disease will be kept in check. A number of groups of allotments where a few gooseberry bushes are grown were declared "infected areas" in 1915, and the regulations as to tipping which were enforced seemed to have prevented any serious spread of disease.

Several experiments in the control of American Gooseberry Mildew have been carried out during the past year, and reports on most of them have been published in the Board's *Journal*. Eyre and Salmon have made a series of tests with ammonium sulphide, a new spray which appears to check the mildew without disfiguring the berries (*Journal*, February, 1917, p. 1098). Lees has demonstrated that the use of potassium sulphide, which has hitherto proved unsatisfactory, can be made effective if mixed with a paraffin emulsion which overcomes surface tension and covers the leaf more completely. The attention of all occupiers of infected premises has been drawn to these reports, as well as to the use of lime sulphur as an effective spray by circular letter sent out in August and September, 1916. Petherbridge and Cole have followed up a clue given last year and have experimented with the application of lime sulphur wash on affected bushes, demonstrating the advantages of spraying upwards from below instead of downwards, as is usually done. According to their evidence, which was published in the form of an article in the Board's *Journal* (November, 1916, p. 750), this method gives far better results in checking the spread of disease. Horne has also conducted a series of trials on the way in which the mildew spreads, and has shown that in certain circumstances Burgundy mixture has given good results. All these experiments look to spraying as a means of keeping the disease in check, and aim chiefly at securing a clean crop of gooseberries. An inquiry of a wholly different character has been conducted at the Pathological Laboratory at Kew with the object of ascertaining the best season for tipping, and whether the formed winter fruit of the American Gooseberry Mildew are sterile or not. A number of shoots covered with the mycelium of the mildew and bearing a quantity of perithecia were collected week by week from infected gardens in Kent and sent to the Laboratory for examination. The results showed that the perithecia are not formed in large quantities till August, and that those which persist on the bushes till late in the spring are as a rule sterile. It was also shown that alternations of mild and cold weather, such as were experienced in the autumn of 1915, caused the perithecia to burst in the autumn and release the spores in great numbers. It may be assumed that these spores died without infecting the bushes, as at that season of the year the plants could hardly be susceptible. If this deduction is correct, it would appear that the diminution in the intensity of the disease in 1916 is, partly at least, due to the season experienced in the autumn of 1915, though it is probable that the cold rainy weather that occurred in the spring of 1916 also retarded the development of the disease. It is certain that the first outbreak did not appear so early in 1916 as in former years, nor was much damage done till comparatively late. The inquiry into the subject is being continued at the present time, and it is hoped that more definite results will be ascertained before long.

On account of the prevalence of American Gooseberry Mildew on the Continent and the present impossibility of securing any control of affected consignments from abroad, the importation of gooseberries was prohibited by Order of the Board.

Wart Disease of Potatoes.—Though the situation as regards American Gooseberry Mildew is very favourable, it is regretted that reports received concerning a second notifiable disease are much less encouraging. Wart Disease of potatoes has spread not only throughout the area known for years past to be infected, but it has appeared, spasmodically it is true, in several new places. Steps have been taken to make the requirements of the Board's Orders better known, and leaflets and warning notices have been widely distributed. Large posters, illustrated with photographic reproductions of potatoes attacked by Wart Disease and by Corky Scab, have been exhibited in many prominent places. and the Board's Inspectors, ably seconded in many counties by the police and the officers of the Local Authorities, have been diligent in searching for the disease. As a result a very large number of new cases have been scheduled, and the occupiers warned as to their liabilities. The greatest number of new cases has been found in Glamorgan, where it has not hitherto been possible to make as thorough a search as was desirable. In many parts of the county every allotment, every garden and almost every plot of cultivated land is affected, so that it is hardly possible to find any limit to the infection. In such cases groups of allotments, or rows of gardens attached to houses in a street, have been declared Infected Areas, and a vigorous attempt made to bring the whole district under control. The reports on the intensity of the disease present indicate that the infection has been active for years past. Another district in which much disease has been found is South Lancashire. The allotments and small gardens here have, as is well known, been declared infected in large numbers for some time, but several farms were reported as having infected patches on them, or even infected fields, which formerly were believed to be free. Renewed inspection has led to the discovery of very many farms bearing diseased crops, some of which were undoubtedly the cause of spreading disease to other places. It has been necessary to take legal proceedings in several cases against the occupiers for failure to report the presence of disease. A third district in which the number of scheduled premises has been very largely increased is the county of Durham, chiefly among the collieries. It is feared that the number of cases in this district is by no means complete. Other places in which new cases have been found in proximity to old cases are Carnarvonshire, Merioneth, the West Riding of Yorkshire and Nottinghamshire. New cases have, of course, been found throughout the infected counties, but in relatively small numbers.

Sporadic cases, very puzzling as regards their origin, have been found in several new districts. Three allotments near the New Forest, at a distance of many miles from any other infected place, have been discovered. Another case was reported from near Poole. A case was reported from Swindon and another from Bletchley. Several cases were discovered at Surbiton, where an Infected Area was declared, and an outbreak took place at Putney. In none of these cases could any definite origin be traced. The owners had often never seen the disease before, and potatoes from the same consignment planted in an adjoining garden remained free from attack.

If, however, the continued spread of the disease and the inability of the Board to check its progress from place to place are disquieting, the results of the Board's policy of dealing with infected premises once the disease has been discovered are highly satisfactory. Wherever the resistant varieties of potatoes have been planted in place of the susceptible varieties, good crops have been raised. In a few instances where the wrong varieties have been supplied in error, disease has appeared, but this, so far from injuring the reputation of the kinds recommended by the Board, has led to a better appreciation of them as soon as the cause of the failure was explained. The result has been that in many allotments and cottage gardens the acreage under potatoes has increased. Instead of the miserably small crops, covered with disease, an abundant yield of sound tubers has been obtained, and in some centres growers who had abandoned potato growing in despair have taken up the culture again. In a recent prosecution in Nottinghamshire one witness declared that since the Board had imposed their regulations the return from the potatoes planted in the allotments he was acquainted with had increased threefold. The chairman of the County Agricultural Committee at a horticultural show in Glamorgan said: "From what your men say it appears that the crop of potatoes at Mardy this year will be six times that of any previous year," while a local tradesman said that prior to 1914 his annual trade in seed potatoes did not exceed one ton, while in 1915 he sold over seven tons, all of the immune varieties. Similar statements were made at several other shows in the district. The Board are informed that the allotment holders in Stafford, who a few years ago had almost abandoned potato growing, are now taking it up again as they are able to get good crops, thanks to the introduction of immune varieties. In Lancashire the success of these varieties has given a fresh stimulus to potato planting, and similar stories are repeated from other places. This is no doubt chiefly due to the merits of the potatoes themselves, which are not only resistant to the disease but give better yields than the old susceptible varieties, though some part of the credit may be claimed for the policy adopted by the Board. Not only is a list of immune varieties sent to every occupier of infected premises but steps have been taken to prepare a series of lists of local and other dealers who stock these varieties, which is sent on application to every prospective grower, while every encouragement has been given to groups of allotment holders to form co-operative societies for the purchase of seed potatoes. A very large number of such societies has been formed as a direct result of this policy, and the result has in nearly every case given great satisfaction. It is proposed to extend this system even further this season, and a list of growers who are able to supply seed has been prepared for circulation. It is obvious that the successful cultivation of potatoes is much helped by a system which brings to the occupier of such infected premises information as to what potatoes he should plant and where he can obtain them.

The Board have taken steps in another direction to assist such potato growers. Owing to the kindness of the Board of Guardians and the master of the Workhouse at Ormskirk, an extensive tract of land has been put at their disposal for testing for immunity to Wart Disease the new varieties of potatoes that are put on the market, while the opportunity is also taken to test their cropping value. Over two hundred varieties have now been tested, and a detailed descriptive list of those which have been found to resist the attack of Wart Disease has been published. Facilities were given to farmers and others interested in the subject to examine the crops just before lifting time, and the potatoes, both those which are resistant to disease and those which are not, were exhibited at the Ormskirk Potato Show which took place last October. The exhibit formed an important feature of the show, which attracted visitors from all parts of the Kingdom. A public conference was held on the second day of the show at which an interesting discussion on several matters relating to potato culture took place. The question of synomyms in varieties and the methods by which Wart Disease is spread were the chief subjects. During the past year several experiments were conducted at the Pathological Laboratory at Kew with the object of investigating certain problems connected with this disease, and Mr. Cotton, by whom the experiment has been carried out, was able to make some important announcements at the conference. In the first place he declared that he had been able to show that the theory which had always been held that *Synchytrium* (the causal organism of Wart Disease) never attacks any plant except the potato is incorrect, as he had succeeded in showing that two solanaceous weeds (*Solanum nigrum* and *Solanum dulcamara*) had developed distinct though small signs of disease when grown in pots containing infected soil. He also emphasized the fact that the disease may be conveyed on the soil adhering to even sound tubers, as susceptible varieties grown in pots infected with soil washed from immune tubers, grown on the trial ground at Ormskirk, had taken the disease. The discovery regarding the susceptibility of the two weeds is perhaps more interesting from a scientific than a practical point of view, but the fact that disease may be conveyed by the soil on immune tubers is both interesting and important, since it not only indicates a new source of possible infection but also further establishes the absolute immunity of the resistant varieties. Further experiments will be conducted during the coming year.

Large Larch Sawfly.—Several other investigations of a scientific and practical nature have been carried out during the past twelve months. The long and elaborate inquiry into the parasitism of the Large Larch Sawfly has been brought to a conclusion, but the results have not been tabulated. It is believed that the conclusions will have an interest for economic biologists, but their practical value is not very great as they are, merely of a negative character. One of the reasons for the termination of the inquiry which has exercised perhaps the greatest influence has been the almost total disappearance of the Sawfly from the infected area. Specimens can still be obtained there after search, but the economic injury to the larch plantations is unobservable.

Other Scheduled Pests.—Very little work has been done in connection with the other scheduled pests. No case of *Phylloxera*, Colorado Beetle, or *Diaspis pentagona* has been reported during the past year, and it has been found impossible to deal with cases of Corky Scab due to *Spongospora subterranea*. Many cases have been reported, and there is some evidence that under certain conditions this disease may prove troublesome and occasion serious loss, but the conditions imply not only bad cultivation but such a wet state of the soil as is unlikely to occur in normal seasons. It has not been recorded as occurring in a severe form in fields. An interesting experiment was conducted at the agricultural station of Leeds University in 1915, a report of which was not received till the present year. A consignment of seed potatoes was received, and on several specimens Corky Scab was present. Owing to the lateness of the season it was impossible to substitute fresh seed, and the land was planted with the best of the tubers, those obviously affected being thrown out. The rest were treated with a solution of formalin varying in strength from 0·5 to 2 per cent. and planted in the field. The result was inconclusive, as no tubers were discovered at harvest time bearing any sign of the scab. The rejected tubers were also made the subject of an experiment with solutions of formalin and copper sulphate. The results in this case also were of a negative character, as no disease appeared on any of the treated tubers and on only two of the untreated. From certain laboratory experiments which were conducted at the same centre it would appear that there is little to fear from this fungus except when the soil is continuously wet. In no case was the plasmodium of the fungus formed below the corky layer, and hence, where the latter is formed near the surface of the potato, the scab is bound to be superficial in character. This type of scab would be expected after a dry season when cork is very quickly formed in the potato in response to the stimulus of any irritant, such as a plasmodium, in its tissues. Where the formation of the corky layer is delayed as is the case when the potato is kept very moist, the plasmodia will naturally go deeper into the tissues of the corky layer; the tuber will then be irregular in shape, and in this way deep-seated wounds accompanied by out-growths produced by the excessive stimulus of the fungus will be the result. This is the canker type which it is natural to expect after a wet growing season. This assumption is borne out by the experience of the present year, when the number of cases of Corky Scab attack on wet soil has greatly increased.

Pests not Scheduled.—With reference to diseases of plants not caused by scheduled pests, a number of experiments and investigations were carried out by the officers of Horticulture Branch during the past season. It is impossible to refer to them all in detail; they have covered such aspects of the subject as the identification of the cause of disease, the investigation of the biology of the organism concerned, and experimental work on likely methods of controlling in the field. Wherever possible the work is carried out in collaboration with the Pathological Laboratory at Kew, and with the advisory and research workers at the various colleges and institutions, and the results are published as they become available. To illustrate the nature of the work, brief references may be made to two problems, one entomological and one mycological, which are engaging the attention of the Board.

Capsid Bugs.—The former problem concerns the "Capsid Bug" disease of apples caused by certain bugs of the family *Capsidæ*. In January, 1915, the Board's entomologist published an article in the *Journal* giving the result of his investigations for the previous years, and showing that in all cases investigated by him the bugs *Plesiocoris rugicollis* and possibly *Orthotylus marginalis* were responsible for the damage. This year, in collaboration with Mr. Petherbridge of the Cambridge School of Agriculture, he has continued his work on the biology of the insects, and also has made a number of experiments in controlling the damage by means of various spray fluids. As has been mentioned previously, the weather in spring was extremely bad, and spraying could only be carried out under great disadvantage. In spite of this, however, it is believed that definite progress has been made, for spraying with various nicotine washes produced not only a considerable improvement in the grade of the crop but also increased its bulk. The problem of controlling these insects is, however, difficult. The damage is done soon after the insects have left their eggs and when the apples are exceedingly small. Each bug appears to be capable of doing extensive injury, and owing to its activity it is often able to hide itself in such a manner that the spray cannot reach it. Further experiments have been planned, and will be carried out as soon as possible. A full report of the work during the year was published in the *Journal* for April, 1917, p. 33.

Apple Mildew.—The second problem concerned Apple Mildew. During the course of the summer of 1915 some observations were made by one of the Board's sub-inspectors on the prevalence of Apple Mildew in Cambridgeshire, and the presence of perithecia in considerable numbers was recorded. In order that more detailed information could be obtained, Mr. Cotton, of the Pathological Laboratory, Kew, made a visit of inspection with one of the Board's district inspectors, and arranged for a series of experiments in controlling this fungus, which appears to be on the increase in England and to have caused some losses to apple growers, the popular variety, Lane's Prince Albert, being specially liable to attack. It was found in nearly every variety of apple in Kent and Cambridgeshire, but except in the case of Lane's Prince Albert, Grenadier, Bismarck, and Cox's Orange Pippin, an expert eye was needed to discern it. A fruit-grower was found who was willing to allow some of his trees to be used for the experiment, and a number of shoots on certain trees showing the disease in various stages and degrees of intensity were marked in the spring of 1916 In order to test the spread and development of the mildew, certain infected blossom trusses were removed from some of the trees and the trusses and terminal shoots from others. The trees were kept under observation during the summer, and a diminution of the disease on the treated trees as compared with the untreated trees was noticed, those which had the terminal shoots removed being much less infected than the others. The bad weather of the summer rendered further inquiry abortive, and it seems impossible to draw any definite conclusions from this season's results.

Isle of Wight Bee Disease.—The supervision of the papers relating to Isle of Wight Bee Disease is included among the duties of the Horticulture Branch, and the correspondence of the subject was again very heavy. The disease now appears to have spread over the whole of England, very few spots being left without infection. No further attempt has been made to secure legislative powers to control the disease, but the study of the disease by the Board's expert advisers has been continuous and many experiments have been conducted. In most cases these took the form of supplying correspondents with small quantities of two drugs which it is believed will cure the disease in attacks which have not developed beyond a certain point. The result has been fairly successful on the whole, but investigations on these lines are unsatisfactory, as it has been found impossible to secure adequate supervision and to prevent the bee-keepers from spoiling the experiment by injudicious action. They often try other cures at the same time, or supply the bees with a double dose of medicine, or neglect their hives in such a way that they fall a prey to other pests. Even in the best circumstances the results are seldom communicated to the Board when a cure is affected. It was, therefore, decided to make an experiment on a new and somewhat extended scale. The test that had been conducted in various centres in the past appeared to justify the opinion that the two drugs which are employed would effect a cure in isolated cases, and it was considered that the time was ripe for ascertaining whether an area of larger size might be dealt with. After some correspondence a village in Buckinghamshire was found, the inhabitants of which were induced by the energy of the chairman of the local association to agree to comply with the Board's requirements and to submit their bees to treatment.

The conditions on which the test was conducted were as follows :—

1. Every colony in the district to be examined by the Board's expert adviser for signs of *Nosema apis*.
2. Every colony declared to be too badly attacked for successful treatment to be destroyed.
3. No other treatment to be applied during the experiment.
4. The bees to be kept under the supervision of a local bee expert.
5. The bees to be finally examined before the experiment is concluded.

The terms were accepted and supplies of the drug sent. Several minor hitches occurred which were perhaps inevitable, and at one time it looked as though the experiment would break down. They were, however, overcome and the work proceeded smoothly. It is as yet too early to say if the result is entirely successful, as the bees must be examined again in 1917, but so far the attempt to keep the disease in check has been attended with fairly satisfactory results. It is reported that while in every village in the neighbourhood for some distance round all the bees have died, in this village where the bees were treated they have thrown off several swarms and given a large supply of honey.

The deadly nature of the disease popularly known as Isle of Wight Disease has naturally led to many attempts on the part of bee-keepers to control or cure the disease, and several specifics have been offered to the public for which remarkable properties are claimed. As requests are made from time to time to the Board to express a favourable opinion on these treatments, or to conduct experiments with them, it is necessary to lay down the conditions which the Board consider must be fulfilled before a claim to have made a satisfactory cure can be substantiated, either by their own adviser or by any other investigation.

1. In the first place it must be established that the colony is attacked by microsporidiosis, that is to say, the disease of bees caused by the presence of *Nosema apis* in large numbers in the bees' intestines. This can only be done by microscopical examination of specimens from the suspected colony. Naked-eye observations are wholly untrustworthy, as there are no true diagnostic symptoms of the disease, and all the common symptoms popularly associated with the disease may be caused by other influences. The only definition of Isle of Wight Bee Disease that can be accepted is the disease caused by *Nosema apis*, and unless the presence of this protozoon can be established in the colony under observation it is impossible to say with certainty that the bees are attacked by this disease. This preliminary precaution is seldom observed by those who claim to have effected the speedy and remarkable cures to which such prominence is given from time to time in the public press.

2. In the second place the treatment must be applied under conditions which eliminate all possibility of other influences being present. The effect of any treatment cannot be judged except by microscopical examination of the bees and the determination of the presence or absence of *Nosema apis*. No opinion can be given as to the value of any drug or treatment applied to diseased bees if another drug or treatment is applied at the same time, whether the intention is to control Isle of Wight Disease or any other malady to which bees are liable.

3. In the third place, and this is perhaps the most important point of all, no treatment can be considered effective unless the bees remain healthy and free from *Nosema* for a considerable space of time. There is no difficulty whatever in stimulating affected bees in such a way as to throw off all the symptoms popularly associated with Isle of Wight, Disease *i.e.* crawling, inability to fly, dwindling, and even, occasionally, dysentery. Many claims have been made of complete cure of affected bees on the strength of a temporary activity or an apparent improvement in the condition of the colony immediately after treatment. In one case the resumed activity of the bees two hours after having been sprayed externally with a stimulating medium was claimed as evidence of a cure of a disease which, as is well-known, is caused by the presence of vast numbers of a parasite deepseated in and between the cells of the chyle stomach Such evidence is of course wholly unconvincing, and no claim can be made to success unless the bees remain healthy for several months and survive the following winter, or unless it can be shown that they no longer carry in their bodies any of the parasites associated with Isle of Wight Disease.

Correspondence.—A considerable correspondence was carried on all through the year with numerous fruit growers who sought advice on the management of their trees and bushes and on the pests which were present on them. Correspondence of this character is seldom satisfactory, as it is practically impossible to give helpful advice without a much fuller knowledge of the facts than the correspondents are willing to give, and only in very few cases can the inquiry be followed up. The scientific officers of the Horticulture Branch are, however, enabled to keep in touch with current problems and to form some estimate of the pests which are prevalent from year to year.

THE NET OUTPUT FROM AGRICULTURE AND ITS DISTRIBUTION.

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IN the *Final Report on the First Census of Production of the United Kingdom*, 1907 (Cd. 6320) the net output per head of persons employed in the industries dealt with in the Census of Production Office is given as £104 for England and Wales. The net output is ascertained by deducting the cost of materials at works from the value of the net output at works. This result constitutes for any industry the fund from which wages, salaries, rent, royalties, rates, taxes, depreciation, advertisement and sales expenses, and all other similar charges have to be defrayed, as well as profits (p. 8).

The same basis of calculation was adopted in the *Report of the Board of Agriculture and Fisheries* on the *Agricultural Output of Great Britain* (Cd. 6277), made in connection with the Census of Production Act, 1906, when the output per person permanently employed in agriculture was ascertained to be £90, counting the farmer in, or £129 if the occupiers were excluded. The accounts of half-a-dozen farms, kept at the Institute for Research in Agricultural Economics, at Oxford, in the year 1914–15 may be cited in general confirmation of this figure, if the rise in prices for agricultural produce since 1906 be allowed for, whilst at the same time they show the distribution of the net output as between landlord, occupier, and labourer, The average net output per man, namely, £169, compares with the higher figure given in the Board's Report, as the occupiers have been excluded from the calculation. The farms concerned are mostly fairly large, and it is probable that the output is higher than the average of the country. The figures vary a good deal from farm to farm, but it is noteworthy that the distribution of the net output as between farmer, labour, and

TABLE I.—*The Distribution of the Net Output from Agriculture*

Farm.	Acreage.	Capital per Acre.	Men per 100 Acres.	Net Output.		Distribution of Net Output.				Distribution of Net Output.		
				Total.	Per Man Employed.	Farmer.	Labour.		Landlord.	Farmer.	Labour.	Landlord.
							Total.	Per Man.				
		£		£	£	£	£	£	£	Per cent	Per cent.	Per cent.
A ..	1,100	8	2·3	4,266	169	2,111	1,377	55	785	49·4	32·2	18·4
B ..	350	11·5	4·7*	2,900	175	1,292	995	58	613	44·6	34·3	21 1
C ..	189	10	4	1,209	158	565	396	52	248	46·7	32·8	20·5
D ..	550	10	3·6	2 569	129	1,273	698	35	598	49 6	27·2	23·2
E ..	270	23·5	8·5†	3 612	157	1,625	1,078	47	909	45·0	29·8	25·2
F ..	440	9	2	1,671	190	870	382	43	419	52·1	22 9	25·0
Average	483	10 8	3 5	2,704	162	1,286	821	48	595	47 9	29·9	22·2

* Including casual women labour amounting to about 1 per 100 acres the year through.

† Including casual boy and women labour amounting to about 3½ per 100 acres the year through.

landlord, is fairly constant, notwithstanding the fact that the farms are scattered all over England and Scotland, and that many varieties of management are represented. One of them is an intensive potato-growing farm; another is a suburban milk-farm; a third is situated seven miles from the nearest railway station; but in spite of all these and other differences the net results are more or less the same. The fact noted in the Board of Trade Report that a large net output per head is usually associated with high wages is exemplified by farms A and B. On the other hand, the farm D, which is situated in a county where the rates of wages are almost the lowest in England, bears out this statement equally in the low output per man employed. The farm E too, may possibly indicate by its results that the experience of industry that a high net output per head is also associated with heavy capital expenditure will probably be repeated in agriculture, for the output per head is very high if it be borne in mind that nearly 59 per cent. of the labour employed was woman labour.

As regards the distribution of the net output, it must be remembered that only in the case of labour is the whole of the share available as net income. Considerable payments have to be met by the farmer and the landlord out of the shares which they retain, and a recalculation of the figures has been made to show the distribution of what may be termed the *net returns*, as distinct from the *net output*. To do this, all the ordinary expenses except labour and rent have been deducted from the total receipts. Besides these, a figure amounting to 7½ per cent. on the capital invested by the farmer has also been deducted, as representing the interest which capital involved in an enterprise, more or less speculative, might reasonably be expected to earn. Lastly, a deduction has been made to the extent of one-third of the rent, as representing the expenditure upon the holding necessary on the part of the landlord in order to maintain the rent. This is not an arbitrary figure. From an inquiry conducted by the Land Agents' Society in the year 1909, it appeared that about 30 per cent. of the rent received by the landlord is expended by him in repairs, insurance, management, and similar payments necessary to maintain the property in a condition to produce the rent.* The final difference represents the surplus available for the remuneration of manual labour, for the farmer's reward as manager, and for the landlord's return on his investment. It would have been far more satisfactory if a further deduction could have been made representing interest on the landlord's capital invested in the holding in the form of equipment. If this could have been done the final figure would have represented only the true rent accruing to the landlord in addition to the reward of farmer and labourer, but the information necessary is not available, nor is there any material upon which to form an estimate likely to be even approximately correct.

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* The figure is the average expenditure on 224 estates, extending to some 2,000,000 acres. See *Journal of the Land Agents' Society*, Vol. VIII., 1909, p. 214.

TABLE II.—*The Distribution of the Net Returns from Agriculture.*

Net Returns.			Distribution of Net Returns.				Distribution of Net Returns.		
Farm.	Total.	Per Man Employed	Farmer.	Labour.		Landlord.	Farmer.	Labour.	Landlord.
				Total.	Per Man				
	£	£	£	£	£	£	Per cent.	Per cent.	Per cent.
A	3,232	128	1,332	1,377	55	523	41·2	42·6	16·1
B	2,307	140	903	995	58	409	39·2	43·1	17·7
C	949	125	388	396	52	165	40·9	41·7	17·4
D	1,873	95	776	698	35	399	41·4	37·3	21·3
E	2,704	118	1,020	1,078	47	606	37·7	39·9	22·4
F	1,175	134	515	382	43	280	43·6	32·5	23·9
Average	2,040	123	822	821	48	397	40·7	39·5	19·8

The average share of each interest on all the holdings is 19·8 per cent. to the landlord, 40·7 per cent. to the farmer, and 39·5 per cent. to labour. The variations from this average are extraordinarily slight when the differences of locality, soil, size, equipment, capitalisation, wages, objects of management, etc., are remembered. The returns are not sufficiently comprehensive to admit of any generalisation being made for them, and many more records, extending over longer periods, will be required before the various interesting speculations which suggest themselves can safely be followed up.

SOME PROBLEMS IN THE GROWTH OF SILAGE CROPS.

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IN a previous number of this *Journal** the author and Mr. A. W. Oldershaw have shortly sketched the underlying principles upon which silage is now beginning to be produced in East Anglia, so that it will not be necesssry to repeat them here. The present article deals only with oats and tares, and does not touch maize and other crops which are grown for the production of silage. It is based upon observations and investigations made during July of the past summer, when the author visited many growers in Norfolk, weighed several portions of their crops and discussed the various cultural operations given to them.

The objects of the inquiry were mainly directed to the investigation of two sets of problems :—

(1) The conditions under which the most satisfactory crops can be obtained.

(2) The costs of producing such crops.

Table I. has been constructed to show the agricultural practice which each farmer has adopted, and the yields of crop obtained. Table II. is designed to show the costs of growing the crops.

Types of Soil.—In the second column of Tables I. and II. are described the characteristics of the soils, and their rental value, the latter representing the farmer's own estimate of the value of each field and not necessarily the average rental value for the whole farm. These two columns enable the reader to picture the type of land in each case; thus field No. 1, light sand with a rental of 5*s*., indicates a very poor, thin type of soil characteristic of a large area of land on the western borders of Norfolk and Suffolk, generally known by the name of " breck " land. Fields 2, 3 and 4 are characteristic of much of the sandy soil in the northern part of Norfolk. Fields 5 and 6 are useful mixed soils, capable of growing heavy crops of mangolds. Fields 7, 8, and 9 are heavy soils of boulder clay origin, too stiff for folding, but not excessively heavy.

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* July, 1916, p. 333.

In the article previously quoted, the opinion was expressed that there seemed to be two extreme types of soil to which silage crops might be economically extended: namely, light soils in dry districts, where early-sown swedes frequently fail, and where the silage crop might be followed by late-sown turnips; and heavy soils, in which case the silage crop would be followed by a bastard fallow in preparation for wheat. Further, it was stated that upon mixed soils, such as Nos. 5 and 6, favourable to the growth of mangolds, the latter crop would probably be found to be more profitable, especially when used for milk production.

Previous Crop.—In making arrangements for growing a silage crop it is essential to select the correct position in the rotation. If the crop is grown in place of roots, or in conjunction with late-sown roots, for the purpose of enabling the land to be cleaned (and this is generally the practice), it is essential that the crop shall be taken in the position normally occupied by roots in the rotation, that is to say, after a previous white-straw crop, generally wheat. Table I. shows that this plan has been usually adopted, but there are certain notable exceptions: in fields Nos. 2 and 3 the previous crop was potatoes, a tilth which most farmers would allot to wheat, but in this case the farmer selected this position in the rotation for his silage crop, because the oats and tares could be grown at very little expense. When we come to consider the costs of production we must remember to allow something for manurial residues and something for the fact that a clean tilth was used for the silage crop. In field 6 the previous crop was sainfoin, which would also be generally regarded as a wheat tilth, but the land was very full of couch and, being on the University Farm at Cambridge, it was intentionally cropped with oats and tares so that observations could be made on the efficiency of the mixture as a "smother" crop. In field 4, the previous crop had been barley, in which mixed seeds had been sown, but as the latter were a partial failure, tares were pressed into the land and with the thin seeds produced a useful crop.

Date of Seeding.—In all cases except one, the crop was sown in autumn. This is undoubtedly the best practice, because not only do autumn-sown oats and tares generally produce heavier crops, but they are fit to cut earlier in the summer, so that the land can be broken up sooner and allow either a longer period for cleaning the land or greater opportunity of sowing late turnips. If several silos are to be filled it may be convenient to sow perhaps a quarter of the area with spring-sown crops, so that when the silage has settled after the first filling the later sown crop may be in its prime and be then used for topping up the silo.

Not only is it important to sow the greater part of the crop in autumn instead of spring, but the best results are likely to be obtained by early autumn sowing, so that the plants have time to get established before the winter frost. Probably the best period for sowing the crop would be the last week in September or the first fortnight in October.

Cultivations.—The total manual labour and horse labour used in the preparation and growth of the crop (but not the harvesting) have been added together in the fifth column of Table I. and expressed in terms of man-days and horse-days per acre. It will be seen that in the majority of cases the number of man-days used has been about 2 per acre, and the number of horse-days from 3 to 4 per acre. This amount of labour is required when the land is ploughed before seeding, and naturally increases somewhat with the heaviness of the soil. In fields 2, 3 and 4 much less labour was expended, but here no ploughing was done for the crop, the seed being drilled upon the land after cultivation or harrowing. As previously mentioned, the tares on fields 2 and 3 followed potatoes, after the digging of which the land was left in a friable condition. Case 4 is interesting and suggestive; the barley crop had been sown with mixed seeds, but these had partially failed, and, in order to fill up the crop, tares were heavily pressed in with the drill in October. It is interesting to notice that in spite of the double sowing the labour involved was very small because it was not necessary to plough the land.

In view of this success it is worth considering whether it is necessary to use the plough in preparing the seed-bed—whether the practice of sowing rye-grass in the corn and pressing the tares into the land after harvest can be generally adopted, or whether more economical results might be obtained by using some other implement (as, for example, the disc-harrow or Kentish broadshare) for quickly breaking up the stubble to a depth of 2 or 3 in. after harvest, and sowing the oats and tares in the shallow tilth so obtained. In this way not only would the cost be reduced, but the firm seed-bed so obtained would generally be considered favourable to tares; moreover, by this practice any shed corn from the previous crop would germinate and contribute to the weight of the silage crop.

Seed.—When discussing the seeding it should be noted that tares are required to make the bulk of the crop because, being leguminous plants, they produce a forage which contains a high proportion of albuminoids; but their stems are so weak that they cannot support their own weight, consequently some other crop has to be introduced for support; otherwise the crop lodges, gets rotten at the base and is most difficult to cut.

Various crops have been tried as the supporting crop. Rye has a stiff straw and would be suitable for the purpose on light soils, but it suffers from two disadvantages: firstly, it is ready to cut some weeks before the tares are fit, with the result that either the tares must be cut too soon, or, as more commonly happens, the rye is allowed to get too old so that its stems have become fibrous and indigestible; secondly, the toughened stems of the rye become twisted on the rollers and bearings of the silage-cutter and frequently cause breakages. Wheat would probably answer well enough as a supporting crop if it could establish itself ahead of the tares, but it grows slowly, and whilst it is tillering in spring the tares get up and choke it out. Winter beans produce stout stems, and are admirably adapted for supporting a tare crop, but should be sown deeply or they may be taken by rooks and pigeons. The possibility of putting in a few beans when the land is ploughed is worthy of consideration.

At present much the most common and most useful supporting crop is the winter oat; in the first place it flowers and ripens at approximately the same period as the tare; in the second place, oats cut quite early make excellent forage, the stems being soft and digestible and the ears very nutritious; lastly, oats are not easily suppressed by the tares, possibly because the oat plant is a poor tillerer compared with the wheat plant, and begins to send up its erect stems earlier in the spring. The grey winter oat is generally used as this variety is probably the best for feeding purposes, but it is worth noting that the black winter oat produces a stouter, stronger stem than the grey, and silage growers whose crops get badly laid might be well advised to test the merits of the black winter oat.

Two other plants are worth consideration as supporting crops, namely, Italian rye-grass and rape. The former, more by accident than design, was used in case 4, and though the crop was a comparatively heavy one, the rye-grass kept the tares off the surface of the ground and enabled the cutting to be done moderately well. It has the further merit of being produced from inexpensive seed; but, on the other hand, it ripens early, and when over-ripe sheds its seeds which in due course may become troublesome as weeds in the succeeding crops. Rape is grown to some extent as a supporting crop in the south-west of England for folding and soiling purposes. It has not yet been tried in England for silage, but American reports suggest that cruciferous crops do not generally produce good silage.

If the crop be sown early in autumn, the rate of seeding need not be unnecessarily high. The truth of this contention is well illustrated in fields 2 and 3, where a seeding of only 8 pecks produced a crop of 2·4 tons of dry material upon light sandy soil, in spite of some damage by hares, while in fields 5 and 8 heavy seedings of 14 pecks per acre produced only 2·3 and 2·6 tons of dry material respectively, though sown on better land. As regards the relative proportion of tares to cereals, it is generally agreed that tares should form the major part of the crop. Probably a seeding of 5 to 6 pecks of tares with 4 to 5 pecks of oats is best in most cases. This will usually secure a maximum crop, and at the same time be a sufficient seeding to suppress weeds. This seeding at pre-war prices would cost 14*s*. to 15*s*. per acre.

Manures.—Since the tare is the more important part of the silage, nitrogenous manures do not as a rule need to be applied, but it is important to give the crop an adequate supply of mineral manures. The soil should contain some lime, and phosphatic manures—superphosphate slag or bone flour—should in most cases be supplied, especially when the crop is grown upon heavy land. In addition, small quantities of potash should be applied to any light soils which are known to be deficient in this constituent. Where the fertility of the soil is very low, some expenditure upon a quick-acting nitrogenous manure for the oat crop will probably be repaid.

Table II. shows the cost of the manures used, charged at pre-war prices, and where no manures were used an estimate of the residual value of the manures from the previous crop has been made. This residual value is not easy to calculate; it has been assumed that it is worth 30*s*. per acre in cases 2, 3 and 6, which can justly be considered as wheat tilths, and at 5*s*. per acre in case 4, when the crop follows barley without extra manure.

The Yield.—Columns 8 and 9 in Table I. show the weight of crop grown. These weights were obtained by weighing the crop from 5 or 6 plots half a rod square in each field, the figures in column 8 representing the means of such weighings. Samples were taken from each plot, and their dry weights were determined; it was found that the weights of dry material varied considerably, for whereas the crop from field 1 contained as much as 30 per cent. of dry material, that from field 8, cut soon after rain, contained less than 15 per cent. of dry material. It is clear that the weight of green crop gives no accurate guide to the production of the field, and consequently the weight of dry material alone has been considered in discussing results. The production varies from 1·4 tons per acre on very poor ground (field 1) to 3·6 tons per acre on field 6, this latter being a splendid crop of oats and tares, and probably near the maximum of production. If we exclude these two extremes, it is seen that the remaining crops approximate very closely to the average crop of the whole series, namely, 2·34 tons per acre of dry material.

Suppression of Weeds.—The economical success or failure of the oat and tare crop for silage purposes very largely depends upon the extent to which it enables the farmer to fight against weeds, consequently this feature has been very carefully studied by the author during the past two sessions, both as regards the condition of the oat and tare stubble and the freedom from weeds of the subsequent crops. It may be generally stated that if the crop is heavy and becomes lodged, as was the case in fields 5, 7, 8 and 9, then the weeds are almost entirely suppressed. In field 8 this suppression of weeds was remarkably perfect; there was scarcely a weed of any description to be seen at the time of cutting, so completely had the tare crop dominated not only the weeds but the oats as well. In these cases, however, suppression was too vigorous, and the crops were partly rotten and very difficult to cut. In fields 4 and 6, where good standing crops were grown, weeds were also well suppressed. Only in fields 2 and 3 had the weeds been able to make any headway, and in these cases the reasons seemed to be too thin a seeding and serious thinning of the crop in places by hares, thus enabling the weeds to get access to light and air.

In most cases it has not been possible to follow closely the subsequent history of the weeds after the crops were cut, but fields 6 and 9 are on the University Farm at Cambridge, and these have been very carefully studied. In these two cases the crop was not made into silage, but into hay, which was cleared from the field some 3 or 4 weeks after cutting. In field 6 no cultivations were done, but the crop was left to make a second growth; this was poor and thin and exerted little check upon the weeds, which were already growing vigorously six weeks after the oat and tare crop was cut. It is therefore clear that the oat and tare crop does not exterminate perennial weeds, but only suppresses them temporarily. In field 9, the oat and tare crop was cut on 20th June, but owing to bad weather could not be cleared until 26th July, by which time quite a quantity of weed growth (couch and docks) were showing. The field was ploughed on 7th August and cultivated with the Larkworthy's broadshare on 13th September, ploughed a second time on 30th September and cropped with wheat on 20th October. The weather during late summer was characterised by frequent showers, and was consequently not very favourable to cleaning, yet the above-mentioned cultivations combined with the smothering effect of the silage crop were sufficient to produce a clean seed-bed. This result has been confirmed by the experience of silage growers, and inspection of several wheat fields after silage grown in 1915 has shown remarkably clean crops.

The silage crop, provided the ground is broken up directly after the crop is removed, undoubtedly provides exceptional opportunities for cleaning land, and for the following reasons :—

(1) The weeds are weak owing to the smothering effect of the silage crop.

(2) The ground is dry because the crop has exhausted the soil moisture, consequently the weeds dry out quickly after ploughing.

(3) The weather is generally hot and dry; this also facilitates the drying up of the weeds.

(4) Before the corn harvest the pressure of farm work is generally not very severe, so that horse or steam labour is available for the work.

Costs of Production.—Table II. shows in detail the costs of producing the green forage under the conditions described in Table I. Some of these figures have already been discussed. Column 2 represents a full year's rent, but no charge has been made for rates, since the silage crop is removed in early July, and the rental value of the land from July to Michaelmas may be taken as being equal in value to the rates and charged

TABLE I.

1 Field No.	2 Type of Soil.	3 Previous Crop.	4 Date of Seeding.	5 Cultivations.		6 Seed, in Pecks.		7 Manures.		8 Weight of Green Crop per Acre.	9 Weight of Dry Crop per Acre.
				Man-days	Horse-days.	Tares.	Cereals, etc.		Cwt.	Tons.	Tons.
1	Light Sand	Oats	Jan. 25..	1·8	3·9	8	8	Bone Flour	3	4·6	1·4
2	Sand ..	Potatoes	Oct. 7..	·4	·8	3	5	Residues ..	..	9·7	1·9
3	,, ..	,, ...	,, 7..	·4	·8	3	5	,, ..	..	10·7	2·4
4	,, ..	Barley	,, 14..	·8	1·2	4	*x*	,, ..	..	15·6	2·5
5	Loam ..	Wheat	,, 18..	1·7	3·0	6	8	Slag ..	4	15·8	2·3
6	,, ..	Sainfoin	,, 20..	2·4	4·3	6	6	Residues ..	..	15·3	3·6
7	Clay Loam	Wheat	Sept. 25..	1·7	3·2	8	2	Super ..	4	12·4	2·1
8	Clay ..	,, ...	Oct. 10..	1·9	3·9	10	4	Slag ..	5	18·6	2·6
9	,, ..	Barley	Nov. 2..	2·7	5·0	6	6	,, ..	5	12·5	2·3
	Average ..	—	—	1·5	2·9	6·0	4·5	—		12·8	2·31

x = 16 lb. of mixture of rye-grass, white clover, alsike, trefoil.

TABLE II.—*Costs at pre-war prices.*

	Rent.	Previous Crop.	Cultivations.	Seed.	Manures.	Cost per acre.	Cost per ton Dry Material.
	s. d.		s. d.	s d.	s. d.	s. d.	s. d.
1	5 0	Oats	14 4	23 0	12 0	54 4	38 10
2	15 0	Potatoes	3 0	10 0	30 0	58 0	30 0
3	20 0	,, ...	3 0	10 0	30 0	63 0	26 3
4	20 0	Barley	5 0	20 0	5 0	50 0	20 0
5	22 6	Wheat	11 9	19 0	12 0	65 3	28 4
6	25 0	Sainfoin	16 9	16 6	30 0	88 3	24 6
7	20 0	Wheat	12 3	17 6	12 0	61 9	29 5
8	20 0	,, ...	14 4	25 0	15 0	74 4	28 7
9	20 0	Barley	19 3	16 6	15 0	70 9	30 9
Average	18 6	—	11 1	17 6	17 11	65 0	28 6

to the subsequent crop. The cost of cultivations in column 3 have been obtained by charging each man-day and each horse-day at 2*s.* 6*d.* The charges for seed and manures have also been calculated upon pre-war prices. Column 8 shows that the costs per acre of producing a crop of tares varies from 50*s.* in field 4 to 88*s.* 3*d.* in field 6, and that the average cost on all fields is 65*s.* It will be noticed that the low costs of cultivation and of seed in fields 2 and 3, where the crops followed potatoes, have been negatived by the high figure taken as the value of the manurial residue from the preceding crop. The low cost of the crop upon field 4 is due to low costs of cultivation, the tares having been pressed into the land with no previous ploughing.

The last column in Table II. gives the cost of producing one ton of dry material, and this is the most important column in the Table. It will be noticed that the lowest cost per ton is that of field 4 (20*s.* per ton); the factors contributing to this result were low cost of cultivation, low estimate of residual manure used, and a good crop. The next best field is No. 6, in which a ton of dry forage costs 24*s.* 6*d.*; in this case the good result is due to an exceptionally heavy crop, the costs per acre being higher than for any other field. Lastly, field No. 1 was the most disappointing; the cost was 38*s.* 10*d.* per ton, and this poor result was due in a great measure to the small size of the crop produced, which, in its turn, was the result of a poor soil and of a late seeding.

No experimental evidence has yet been obtained upon the losses suffered during the storage of oat and tare silage, nor upon the feeding value of the same. It is hoped that this evidence may be collected during the coming season.

THE MANUFACTURE OF CHEESE IN CO-OPERATIVE DAIRIES.

SHORTLY after the outbreak of War, the Board issued a Special Leaflet (No. 41) advising milk producers to convert their surplus milk into cheese; to manufacture cheese instead of butter; and, by the exercise of greater economy in calf-rearing, to increase the amount of milk available for cheese production.

In 1915, County Education Authorities throughout England and Wales were asked by the Board to encourage the manufacture of cheese in all districts where the supply of milk was in excess of what was required for human consumption. As a result 19 counties took action under the scheme suggested by the Board, and between them 33 new cheese-making schools were established and a large number of teachers were employed.

The effect of these cheese schools, coupled with the home visits paid by the instructresses, has been to arouse very considerable interest in cheese-making, and has already gone far towards establishing the industry in many areas where cheese has hitherto not been made.

The advancement of the industry has also been assisted by the comparatively high prices at which cheese has been selling.

Principal Uses of Milk.

During the period of food stress occasioned by the War, there are three ways in which our milk supply ought mainly to be used. These are :—

(1) For direct human consumption.
(2) For the rearing of calves, and
(3) For cheese-making.

Almost all other purposes for which milk is used are, in the present circumstances, wasteful.

Of the three uses above mentioned, the first is the most important, and all legitimate demands in this connection should be satisfied before the other purposes receive consideration.

It is necessary, however, that very great care should be taken by householders to make the fullest use of all supplies purchased by them ; that the milk whilst in their charge should be properly cared for, so that all loss of food material may be avoided ; and that the quantity purchased should be strictly limited to the minimum requirement.

Similarly, suppliers of milk should take all such precautions as will prevent the waste of any surplus that they may have over and above what is necessary to supply their trade.

With regard to calf-rearing, substitutes for milk should be employed entirely from the age of six weeks onwards. To feed milk in any form to calves beyond that age, is undoubtedly an economic waste of human food.

If all these precautions were adopted a much greater supply of milk than is at present available would be at the disposal of the cheese-maker.

Importance of Cheese-Making

The Board advocate the manufacture of cheese for two reasons :—

(1) Because the manufacture of cheese is the best way of conserving milk as a food. It retains the casein—the most valuable food constituent of the milk—which is not the case when butter is made. The product can be stored for a considerable length of time and is less perishable than most other forms of dairy produce. The by-product, whey, is an exceedingly useful pig food, and may to some extent be used for the rearing of calves.

(2) Because, though cheese-making is an industry particularly to be encouraged during the War, it is also one which will be of considerable advantage after the War to those who adopt it. Great Britain is far from being self-supporting in the matter of cheese supply, and for many years cheese has been largely imported.

A few decades back the over-seas supplies were plentiful, but these supplies in relation to the country's requirements have for some time past been declining, and the indications are that as time goes on this country will have to depend more and more on her own production of cheese.

There is every prospect, therefore, that the industry is now on a firmer foundation, both with regard to the present and the future, than it has ever been before.

A further advantage of the cheese-making industry to the country lies in the fact that cheese is made at a seasonable time, usually when milk can be produced at the lowest cost, *i.e.* when the cows are on grass.

A cheese-making farmer usually arranges for his cows to calve down in March or April, which means that he can feed his stock during the winter almost entirely on home-produced feeding stuffs.

Co-operation in Cheese-Making.

As a result of the educational campaign, which was particularly in evidence last season, the above facts are becoming more clearly recognised, and very many dairy farmers who are not suitably situated for the sale of whole milk are now either starting, or are desirous of starting, the manufacture of cheese.

The movement is being checked, however, in some districts, by the fact that the home dairies do not provide adequate accommodation for cheese-making. This is more particularly the case in those districts where the manufacture of cheese may be regarded as a new industry; and also because the establishment of a cheese-making dairy involves a certain outlay in special apparatus. In such cases as these the obvious solution is co-operation.

Several co-operative cheese factories are already in existence, and some of them were established long ago. Many instances of success might be cited as well as some cases of failure. In regard to the latter, it is fair to state that the great proportion of failures which have occurred have been in consequence of indifferent management or of the want of loyalty on the part of the members.

To secure success in any form of co-operation three things are necessary: it is essential that there should be genuine interest, true loyalty, and efficient management. Where these three circumstances exist, co-operation in cheese-making is one of the easiest forms of joint effort to establish.

Advantages of Co-operating.

The chief advantages to be gained by dairy farmers joining together for the purpose of converting their milk into cheese are:—

(1) The cost of manufacture is less.
(2) There is greater uniformity in the quality of cheese made.
(3) The losses from waste are reduced.
(4) A greater range of market becomes available.
(5) There is less inconvenience and untidiness in the farmer's home.
(6) A small producer of milk receives the same benefits as the larger farmer.
(7) It obviates the necessity of modifying the home dairy and the purchase of apparatus.
(8) It reduces labour.
(9) By joining together, dairy farmers can afford to engage the services of a really skilled cheese-maker, and thereby ensure the production of a high grade cheese.

These are all matters of great importance,

Modern conditions in dairying, combined with the shortage of labour, are circumstances which are gradually forcing farmers to co-operate.

In districts where cheese-making is being taken up for the first time the establishment of the industry on a co-operative basis is most desirable.

Before a co-operative factory can be started it is necessary to have a guarantee of a supply of a sufficient quantity of milk, and to secure enough capital with which to establish and equip a dairy or factory.

In regard to the quantity of milk which is necessary, it is hardly possible to make an exact estimate. The amount may be from 200 gal. daily, upwards.

It is clear, however, that the greater the quantity, the less is the proportionate cost per gallon of the working expenses. When only 200 gal. per day are supplied, the expenses are rather heavy, and the difficulty of paying for expert management is proportionately increased. Such small quantities can, however, be managed with success, but the ideal quantity is a minimum average daily supply of 1,000 gal. throughout the cheese-making season—April to October.

The amount of capital required varies considerably with the local conditions and also with the magnitude of the undertaking. If there is a building in existence which can readily be adapted the expense is not great, and the raising of capital should present no difficulty. The procedure adopted to obtain the capital is also capable of variation, but probably the most satisfactory method is for each member to be required to hold shares in proportion to the number of cows whose milk he intends shall be delivered at the co-operative centre.

In order to demonstrate further the possibilities of co-operation in this country, several county authorities have, at the suggestion of the Board, recently established co-operative cheese schools.

The most difficult part of setting up a satisfactory system of co-operative dairying lies in the initial steps; for unless these are taken in the proper order, and in accordance with the most approved business methods, the result will not be all that might be desired. For this reason the Board have prepared and are about to print a complete scheme of procedure for the establishment of co-operative cheese factories. A copy of this scheme may be obtained gratis and post free on application to the Board. (Pamphlet A303/I should be asked for.)

SKIM MILK CHEESE.

THE utilisation of skim or separated milk for the manufacture of cheese has in the past been confined to a few districts where butter-making has been largely practised. In other areas where there was a plentiful supply, a small proportion has been used for the manufacture of casein, but the bulk has been used on the farms for the feeding of calves and pigs.

Because skim and separated milk has been so largely fed to stock, and has been valued at a price much below that of new milk, a wrong impression has been received as to its value as a human food. In many instances the value of separated milk has been placed at from one-sixth to one-eighth of that of whole milk, but nevertheless, more than two-thirds of the nutritious dry-matter originally in the whole milk is contained in the separated milk ; in other words, of the fat, albuminoids and sugar in the whole milk, only the fat is taken off in the cream, and the albuminoids and sugar remain in the separated and skim milk.

At the present time it is of vital national importance that every effort be made to increase the supply of human food, and therefore skim and separated milk, either as milk or in the form of cheese, should be utilised for this purpose to the largest possible extent. The gain in the form of human food from turning skim and separated milk into cheese, rather than feeding it to pigs, should be quite clear when it is stated that 4 gal. of separated milk will make 3 lb. of cheese, whereas the same quantity fed to pigs will produce 1 lb. pork (and that at a more distant date and after the utilisation of other expensive foods). If it is the custom to feed the separated milk to calves, it should be noted (1) that calves can be reared quite satisfactorily from the age of 6 to 8 weeks on materials which are of no use as human foods, and (2) that it is desirable to rear a smaller number of calves than usual during the present season.

On many farms and in private dairies, where butter is made for home use, the amount of skim and separated milk available is such that an appreciable amount of cheese could be made in the course of the season. The cheese could be used at home or sold locally, and if reasonable care is exercised in the management of the milk and in the process of making the cheese, a thoroughly satisfactory and most nutritious article of food should be produced. The method of manufacture described below has been worked out by Mr. A. Todd, of the British

Dairy Institute, Reading; a large number of excellent skim milk cheeses have been made at Reading in February and March of this year, and the system can be confidently recommended.

Buildings and Utensils.—A dairy used for butter-making may be readily adapted for cheese-making, or almost any clean, airy, sheltered building may be used. If a fair quantity of cheese is to be made, then another room will be required for ripening and storage purposes; this room (or a clean cellar) should be fitted with shelves round the walls. Both rooms should be freely ventilated, and all windows and ventilators should be made to open and close as desired, so that the temperature of the rooms can be controlled.

The utensils required will depend on the amount of milk to be dealt with and the kind of cheese to be made. Where only small quantities of milk are available, there will be required one or two tubs of a capacity of 6 gal. each, with wooden racks made to fit inside the tubs, cheese moulds and followers such as those used for the manufacture of Caerphilly or Small Holder* cheese, a milk strainer, a large knife for cutting the curd (a carving knife will do), a skimmer, a measuring glass, a thermometer, rennet extract, cheese cloths, and weights up to 28 lbs. for pressing the cheese. Where larger quantities of milk are available, larger tubs should be used, but the curd obtained should be made up in cheese not exceeding 10 lb. weight; the moulds and followers used for the manufacture of truckle Cheddars are quite suitable for this size of cheese, and in addition, a properly constructed cheese press will be necessary. Generally speaking, the equipment for Caerphilly or Small Holder cheese will be most useful for the manufacture of skim milk cheese.

The Milk.—It is essential that the milk intended for cheese-making should be perfectly clean and in good condition. Milk which contains much sediment, or has become in any way contaminated, cannot be made into good cheese.

Skim milk, *i.e.* the milk left when the cream is removed by hand-skimming, usually contains from ·5 to 1 per cent. of fat, and separated milk, *i.e.* the milk obtained when the cream is removed by a separator, contains from ·1 to ·3 per cent. of fat. While it is possible to make cheese from separated milk, or from skim milk containing less than 1 per cent. of fat, this is not to be recommended; the resulting cheese will be hard and leathery, and, though nutritious, will be very unappetising. Much better results will be obtained by using skim milk containing at least 1 per cent. of fat, or separated milk which has sufficient whole milk added to it to raise the fat content to between 1 and 1·5 per cent. Skim milk of the desired quality can easily be obtained by less thorough skimming. Where a separator is employed 1 gal. new milk added to 4 gal. separated milk will give a mixture of the desired fat percentage in the case of Jersey and Guernsey herds; with Shorthorns, Devons, etc., a slightly larger proportion of new milk should be used.

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* Some firms of dairy utensil manufacturers supply moulds and followers in complete sets specially designed for this type of cheese, and equally suitable for skim milk cheese.

A very slight increase in the percentage of fat in the milk has a notable effect in improving the palatability of the cheese. Where both butter and cheese are made, the small quantity of new milk added to the separated milk will reduce slightly the yield of butter, but this will be more than recompensed by the improved quality of the cheese.

Cheese made from milk of the above quality will be ready for eating in from 3 to 5 weeks from the date of manufacture, and will keep in good condition for 8 to 10 weeks; afterwards it becomes rather hard and dry. If it is desired to make a quantity of cheese which will keep in first-class condition for six months or longer, whole milk with about 3 per cent. of fat should be used, and the method of manufacture modified to that usually adopted for truckle Cheddars.

Method of Manufacture.—*Preparation for Rennetting.*—Five gal. of milk will make a cheese of convenient size; larger quantities may be used if there are sufficient utensils and accommodation for storage. Before the rennet is added it is desirable that the milk should have developed a certain amount of acidity.* Where skim milk is used the period of setting the milk for cream-raising will usually have sufficed for this purpose, and the milk should be thoroughly stirred in the tub and raised to a temperature of 82° F. Where separated milk is used it will be desirable to have 2 to 4 gal. kept from the previous evening in order to give time for the acidity to develop; the requisite additional quantity of separated milk and the 1 gal. of new milk can then be added in the morning, the whole thoroughly mixed and the temperature raised to 82° F. Too much acidity is undesirable or the cheese will become hard and brittle. Rennet should be added at the rate of 1 dram to 3 gal. of milk, or enough to coagulate the milk to a condition suitable for cutting in 35 minutes. The correct quantity of rennet extract should be diluted with six times its bulk of water, and then thoroughly mixed with the milk; after careful stirring for from 2 to 3 minutes the tub should be covered with a cloth and the milk left untouched till firm enough for cutting.

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* See footnote on page 178.

Cutting the Curd.—The curd should be cut when it splits with a clean fracture before a thermometer or finger drawn through it. The cutting can be done by specially-made American curd knives, but a long-bladed knife for the up-and-down cuts, and a skimmer for the horizontal cuts will do quite well; the cutting should be continued carefully until the curd is reduced to pieces about half an inch square; cutting to smaller cubes is undesirable. After cutting, the curd is gently stirred by hand to allow the whey to separate, then it is allowed to settle to the bottom of the tub for 15 minutes.

Cooking the Curd.—The curd is next stirred up gently, and the stirring continued while the temperature is gradually raised to 86° F. The usual method of bringing about this rise in temperature is to place a cheese-cloth over the tub and pressed down into the whey so that a quantity rises inside the cloth; some of this whey (4 to 5 qt.) is ladled off into a pail and its temperature is raised, by the immersion of the pail in hot water, to such a degree that when it is poured back into the cheese tub the whole of the contents may have a temperature of 86° F.

When this temperature is reached the curd is allowed to settle to the bottom of the tub for another 30 minutes; at the end of this time it should be fairly firm, bright in appearance, sink readily to the bottom, and on pressing a little in the hand the particles should cohere and be a little springy. If these conditions are met, the whey should be poured off* through a straining cloth and the curd collected, tied up in a bundle in a cheese cloth and replaced on the rack in the tub for 20 minutes. At the end of this period the particles of curd should have matted into a solid mass, and this should be cut into blocks 4 in. square and tied up again for a similar period. This cutting and retying in the cheese-cloth should be repeated for other two or three times, or until the curd has matured and dried to a more flaky condition,* the time required being about 1½ hours from the removal of the whey.

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* Should the apparatus and chemicals be at hand for determining acidity by the acidimeter, the process of manufacture should be regulated as follows:—Acidity of milk at rennetting—not exceeding ·19 per cent.; acidity of whey when removed from curd—·12 per cent.; acidity of whey at salting—·18 to ·20 per cent.

Salting and Moulding.—The curd is now weighed, broken up by hand into small fragments, and salt added at the rate of 1 oz. to 3 lb. of curd. The salt must be thoroughly stirred in and the curd is then ready for filling into the cheese mould.

The mould is lined with a cheese-cloth of suitable size and the curd filled in rapidly and evenly by hand. When filling is completed the edges of the cloth are turned over the curd, the wooden follower is placed on top, and pressure applied at once by means of a 14-lb. weight. In 2 hours time the cheese is removed from the mould, turned and replaced, and pressure applied to the extent of 28 lb. It is left in this condition overnight. Next morning the cheese is taken out of the mould, the cheese-cloth removed, the edges trimmed and a bandage of clean calico sewn round the cheese. It is then returned to the mould and the 28-lb. weight replaced for two hours ; after this period has elapsed the cheese is finally removed from the mould, placed on a table or shelf in the making-room to dry somewhat and is turned daily. After 2 or 3 days it should be removed to a shelf in the ripening-room and turned daily ; in 3 to 5 weeks it is ready for use.

Suggestions for Cropping in 1917, with Special Reference to Difficulties Arising out of the Severe Winter and Late Spring.

THE Technical Committee of the Food Production Department of the Board have had under their consideration cases of possible difficulty which may be encountered by farmers in arranging their cropping this year. The recommendations made by the Committee for meeting these difficulties are given below :—

1. **Partial Failure of Autumn-sown Crops.**—(*a*) *Wheat and Oats.*—The common plan of harrowing a thin plant of winter wheat or oats to promote tillering may in some cases be inadvisable this year owing to frost having lifted the plants so much that harrowing would completely uproot a large proportion. If the crop is so thin as to hold out no hope of a satisfactory result, a spring corn crop may be sown in it. Mixed grain is not as a rule saleable or useful except for stock feeding, and spring wheat and oats should be selected for filling up winter wheat and oats respectively, but in case of wheat care must be taken to select an early ripening variety, such as April Bearded or Red Fife. Even with these, sowing should be completed by the middle

of April. Failing suitable varieties of spring wheat, barley should be selected in preference to oats for filling up a thin wheat plant, as an oat and wheat mixture is not suitable for milling.

(*b*) *Beans.*—In the South of England it is a common custom when beans are sown on rather light land to drill white turnips about the beginning of June in rows alternating with those of the beans. After the beans have been harvested the horse-hoe is set to work to cultivate between the rows of turnips. They are not thinned, and produce very useful winter food for sheep. Rape sown broadcast at the rate of 4 or 5 lb. an acre is sometimes substituted for the turnips.

2. **Inability to Sow Spring Corn Crops at the Usual Time.**—In the case of oats there are early ripening varieties, such as Yielder, Black Tartarian, Tartar King, Golden Rain, which may be sown comparatively late with fair prospects of success, and any of the barleys, except Archer's Stiff Straw, may be put in up to mid-May, but after this one of the following crops is to be preferred :—

(*a*) *Linseed.*—This is best suited to medium or rather heavy soils and does well after old grass. Seed should be sown at the rate of 80 to 100 lb. per acre not later than the end of May. Special care must be taken in securing good seed. "Plate" linseed appears to be the most suitable for seed production, but if commercial Plate seed is used care would have to be taken to see that it is clean and of good germination. If any difficulty is experienced in obtaining seed locally, reference should be made to the British Flax and Hemp Growers Association, 14 Victoria Street, London, S.W. 1. Full particulars of the cultivation of the crop are given in the Board's Leaflet No. 278, and in the *Journal of the Board of Agriculture* for February, 1916.

(*b*) *Buckwheat* is grown largely on fen soils, but it also has the advantage of thriving on the poorest sandy soils and may be sown in late May or early June. If drilled, about 40 lb. of seed is required per acre; if sown broadcast, 2–2½ bush. per acre should be used. On the poor soils, for which it is best suited, a yield of 3 or 4 quarters of seed may be expected. Buckwheat flour may be used to mix with wheat flour for bread-making, and the whole grain is a useful food for pigs, chickens and poultry generally. An article on the cultivation of Buckwheat appeared in the *Journal of the Board of Agriculture for* February, 1916.

(*c*) *Oats and Vetches or Oats and Peas*, if sown before the end of May, will give a very useful forage crop either for use in late summer as green food or for making into hay or silage. If the soil is not in good condition 1 cwt. or so of sulphate of ammonia per acre should be given either before sowing or as a top dressing. A suitable quantity of seed would be about 3 bush. of oats and 1 bush. of vetches or peas per acre.

(*d*) *Maize*.—In the Eastern, South-Eastern and Southern districts of England maize is a most useful forage crop, particularly for dairy farmers who require a supply of succulent food when the pastures fail in autumn. As a rule, thorough cultivation and liberal manuring of the ground are considered essential, but, as sowing may be made until fairly late in June, it would be possible to sow the crop with prospects of fair results in a good many of the cases under consideration. The chief difficulty likely to be experienced is the persistence of attacks by rooks, pheasants and other birds. The best method of prevention is that of "stringing" the field as soon as the seed has been sown. (Full particulars of the cultivation ot the crop are given in the Board's Leaflet No. 73.)

(*e*) *Swedes, Turnips or Rape* sown in May or June would be available for use in autumn, and the two latter could be cleared sufficiently early for the sowing of winter wheat or oats.

(*f*) *Mustard* sown in July or August would give useful sheep feed in September and October and make a good preparation for wheat.

(*g*) *Bare Fallow*.—In cases of exceptional difficulty, and as a last resort, attention may be concentrated on the crop for 1918, the land being worked as a bare fallow with a view to sowing wheat early in autumn.

3. **Failure of a Spring-sown Corn Crop owing to Attacks of Wireworm.**—In most cases the full damage is not evident until about the end of May, and as maize is also susceptible to attack by wireworm the best plan would be to sow white turnips, rape or mustard, which are comparatively immune.

4. **Reluctance to Sow Mangolds, Swedes, or Turnips in the ordinary way owing to anticipated Lack of Labour for Singling and Weeding.**—This ought not to be a common difficulty, as labour of the kind described can be performed quite well by women and children. In extreme cases Kale (Marrow Stem or Thousand Head), Rape or White Turnips, sown either broadcast or in rows, may be substituted. Maize is another good substitute, and oats with vetches or peas may also be grown and made into hay or silage if not required for use as green fodder.

5. **Shortage of Cabbage Plants owing to Damage by severe Frosts or Wood Pigeons.**—This may be remedied by making spring sowings of suitable varieties, and in view of the shortage of labour farmers are advised, where possible, to sow at least part of their cabbages direct in rows and to thin out afterwards rather than to transplant in the ordinary way. The only disadvantage of this system is that more seed is required than when it is sown in a seed bed, but this difficulty can, if desired, be avoided by mixing the cabbage seed with some white turnip seed. In all probability 1 lb. of cabbage seed per acre will give as many plants as are required, and the turnips, which are easily distinguishable, can be struck out when singling is done. In the event of the cabbages failing owing to attacks by "fly" or other causes, it is possible that a sufficient number of the turnips would be left to produce a crop for early autumn use.

The advantages of drilling cabbages as compared with transplanting are: (*a*) a great saving of labour; (*b*) a great reduction in the risk of loss through drought. Care must be taken to select a suitable variety.

Giant Drumhead,	drilled	in April,	will come in	for use in	November—March.
Early Drumhead	,,	,,	,,	,,	September—November.
Sheepfold	,,	,,	,,	,,	September—November.
Early Market	,,	April and May		,,	September and October.

The Drumhead Varieties, either Late or Early, give the heaviest crops, and the only advantage of the Sheepfold and Early Market type is that they are ready a little earlier and are easily marketed if not required for stock feeding.

In view of the great demand likely to be experienced for cabbage plants, not only from farmers but from allotment holders and cottagers, it is recommended that seed beds be laid down in school gardens in suitable districts. In the interest of the national food supply it is desirable that an extended area of cabbages should be grown this year.

Rape Pastures.

I. **Introduction.**—The improvement of much of the upland grazing in Wales and in many of the English counties may be effected by the formation of rape-pastures. These pastures are established by ploughing down the old turf, and without resort to a summer fallow or any preliminary cropping, preparing a tilth and sowing down a seeds mixture under rape.

The recommendations made are based on the results obtained in trials conducted in Mid-Wales by the Agricultural Department of the University College of Wales, Aberystwyth, particulars of which are given below (p. 185).

II. **Conditions Necessary for Success.**—The direct formation of a rape pasture can be successfully undertaken when the following conditions are fulfilled:—

(1) The rainfall must be high, say over 30 in. per annum.

(2) The soil must be of a loose and friable nature so that a good tilth can be easily and quickly obtained.

(3) It must have been possible completely to bury the turf.

(4) The turf should be comparatively free from gorse or bracken.

(5) The land must be ready for sowing by the end of June at the latest.

(6) There should be a reasonable chance of obtaining a clean seed-bed without resort to extensive tillage operations

(7) The fences must be in good order so that the grazing may be regulated.

III. **Practical Recommendations.**—In forming a rape pasture the following practical details should receive careful attention:—

(*a*) *Breaking up and Sowing.*—The furrows should be turned over flat; a broad, flat furrow should be aimed at rather than a narrow, tilted one. The "one-way" plough is probably the most suitable implement for the hilly ground under consideration.

In order to obtain the best results lime and basic slag should be applied. Lime need not, however, be regarded as invariably essential, but basic slag (6–10 cwt. per acre) should always be used. It must be remembered that basic slag will not only encourage the clovers and, therefore, react on the fertility of the land when the ley or pasture is subsequently broken up, but will also ensure a good yield being obtained from the rape and turnips.

The lime (if used) and basic slag may be applied and harrowed in at any convenient time after the land has been ploughed.

The best method of sowing the seed on clean land would be as follows:—

Harrow as frequently as is necessary to obtain a satisfactory tilth and sow the rape, turnips, rye-grass, red clover and chicory; then harrow with a light chain or brush harrow, sow the small seeds and roll.

(*b*) *Seeds Mixtures.*—Reliable seed and adequate seeds mixtures must be employed. The nature of the actual mixture used will be dependent to some extent upon the prospects of obtaining a good sward. If a good tilth can be assured, and if lime and basic slag have been applied, it would be wise to sow a good, even if expensive. mixture. If, on the other hand, only a moderate tilth can be expected and the prospects of obtaining a lasting sward (*e.g.* for four years and upwards) are but slight, a cheaper mixture would he more suitable.

A suitable comparatively cheap mixture would be as follows:—

	Per acre.
Perennial Rye-grass	16 lb.
Cocksfoot	6 „
Timothy	4 „
Broad Red Clover	4 „
Wild White Clover	1½–2 „

A better and more expensive mixture, which should only be used when there is every prospect of obtaining a sward which will "hold" for four to six years, would be—

	Per acre.
Perennial Rye-grass	12–14 lb.
Cocksfoot	6–8 „
Timothy	4 „
Crested Dog's Tail	1 „
Broad Red Clover	2 „
Late-flowering Red Clover	2 „
Alsike Clover	2 „
Wild White Clover	1½–2 „
Chicory	2–3 „

On poor fields it would be an economy to substitute 1 lb. of wild birds' foot trefoil (harvested in England) for a part of the wild white clover. The inclusion of late-flowering red clover, or even broad red clover, will add materially to the value of the grazing during the first autumn and the subsequent spring and summer.

Chicory has proved itself to be very satisfactory in the trials in Wales, and has given a substantial amount of keep during the first autumn. At present prices, however, it should only be sown when the conditions are very favourable.

Rape and turnips mixed have shown themselves to be the most reliable nurse crop. The quantity of seed sown should not exceed 3 lb. per acre.

Rape or a mixture of rape and turnips also makes an admirable "nurse" crop in the case of fields that have been through the rotation. It is to be especially recommended in the case of fields that are to be put down for a period of years and from which several corn crops have been previously taken.

(*c*) *Subsequent Treatment.*—The herbage must be carefully grazed the first autumn, care being taken not to allow the grasses and clovers to become " winter proud " ; at the same time, until the herbage is well established, stock should not be turned into fields during periods of excessive rainfall, for fear of puddling the surface.

It is desirable to roll the field early in the spring, especially if there has been much frost during the winter. A top dressing of basic slag (5 to 6 cwt. per acre) may be applied with advantage during the early spring of the third year ; this will assist the " sward " to " hold " for a further period and add to the fertility of the soil when the ley is finally broken.

IV. **Trials in Mid-Wales.**—The following is a brief account of the trials conducted in Mid-Wales : Plots (¼ acre) were started in 1916 at (*a*) Pen-y-Bank, Llangybi (Cards.), about 400 ft. above sea-level ; (*b*) Talfan, Lampeter (Cards.), at 1,000 ft. above sea-level ; (*c*) Llanidloes (Mont.), 1,200 ft. above sea-level ; (*d*) Craigol, Newbridge-on-Wye (Brecon), 1,300 ft. above sea-level. Two fields were also put down at Cilmery, Builth Wells (Brecon), at about 650 ft. above sea-level.

The herbage was in every case very poor and of but slight productive value ; the field at Llangybi was partially covered with gorse and bracken, and the soil was of a loose and friable nature. The Cilmery fields were of a somewhat similar nature, but without gorse ; bracken was present on one of the fields. The Craigol and Llanidloes fields were hill grazing that had probably never been ploughed ; at Craigol there was a dense canopy of bracken.

The field at Talfan was very stony and the turf very rough and difficult to plough. It was intended to plough all the fields by Christmas and to leave the turf to partially decay and the sod to disintegrate until May. In no case, however, was the ploughing completed until a considerably later date. At Llangybi the gorse had to be dug by hand and the ploughing was not finished until the end of March. At Cilmery and Craigol the ploughing was not completed until as late as May 10th. The fields were all steep.

Lime (burnt) was applied under the harrows before the seed-bed was prepared at Llangybi (30 cwt. per acre) and Talfan (30 cwt. per acre) ; basic slag (6 to 8 cwt.) was harrowed in with the seeds at all the centres.

Excellent and clean seed-beds were obtained at Llangybi, Cilmery and Llanidloes. A moderate seed-bed was also obtained at Craigol. It was impossible to obtain a sufficiently good tilth at Talfan, where the ground, as well as being difficult to work, became full of spurrey and sheep sorrel. At this centre seeds mixtures were consequently not put down, but rape and rape and turnips were sown and gave a satisfactory bite of rape and turnips in the autumn ; the field will be again ploughed and put down to a rape-pasture this spring.

At each of the other centres the rape-pastures were sown down between 31st May and 24th June ; the amount of seed used for the " nurse " drop varied from 3 lb. to 4 lb., and consisted of rape alone, turnips alone, and rape and turnips mixed on the several plots. The seeds took well at every centre, but at Craigol the bracken came up thickly all over the plots and largely smothered the rape and turnips ; the " seeds," however, obtained a fair hold on the ground and there was a satisfactory bite of grass, rape and turnips in the autumn ; it cannot yet be said, however, whether a remunerative herbage will establish itself. At Llangybi, Cilmery and Llanidloes, the growth of the grasses (especially cocksfoot and rye-grass) and clovers was surprisingly good by the autumn, and the rape and turnips had also given good yields. All the plots were grazed down with sheep ten to twelve weeks after the seeds were sown, and it was apparent when the plots were visited in February that a thoroughly satisfactory sward had been established at each of these three centres. Bracken reappeared to some extent at Llangybi, but this was hand-pulled as it came up ; it also came up upon one of the fields at Cilmery, but Mr. Bligh will cut it down with the mowing machine once or twice this summer.

Reports from Mr. Stanley M. Bligh, who put down the fields at Cilmery, and who is experimenting with rape pastures on a large scale in Mid-Wales, show that the expenditure incurred in forming the pastures may be recovered in from 15 to 18 months, and that the profits obtained are far greater than from the original poor hill grazing.

V. **Conclusion.**—It is generally realised that top dressings do not produce immediate results on very poor fields where there is a matted and unproductive herbage. It is better under these circumstances to break up the land and re-seed. When it is intended to establish a rape-pasture, it is of course desirable that the ploughing should be done in the winter. An old turf is broken better under wet conditions and the ploughing can often be undertaken when the teams would otherwise be idle. It is, nevertheless, often possible to establish a sward on fields with a friable soil when the ploughing is delayed till as late as the middle of May. In the case of very inferior pastures of negligible productive value in hilly districts in Wales and the West of England, farmers who are able to break up such land during the coming months are urged to do so; for, even if a rape-pasture cannot be established this coming June, or if rape and turnips cannot be sown, a summer fallow will bring the field into good condition for crops in the spring of 1918. It should be added that rape is a very valuable feed for sheep, being particularly useful for fattening off wether lambs and draft ewes.

Mole Draining.

WAR Agricultural Committees and farmers who have powerful plough engines at their disposal are urged to consider the possibility of using them during the coming months for mole draining. A large area of wet clay land in the country can never be really productive either under grass or arable crops in its present state. Some of this land has never been drained at all, while in other cases the drains have been laid too deeply or have become hopelessly choked. Owing to the scarcity of labour ordinary pipe draining is now out of the question but, even if labour were available, the cost would often be regarded as prohibitive. Mole draining provides a cheap and effective alternative method of improvement. The total cost before the War was not more than 20*s.* to 25*s.* per acre, and on average clay soils the drains remain effective for 8 to 10 years, or even 15 to 20 years where the conditions are particularly suitable. The cost is often fully recovered in the increased crops obtained the first year.

The mole plough consists of a round steel plug about three inches in diameter attached to the lower end of a strong coulter which is fitted to a suitable frame mounted on wheels. The procedure is similar to that adopted when draining in the ordinary way. The outlet is first decided upon and then the main and sub-main drains are laid. As a rule pipes are used for these and also for the beginning of each mole drain to make a good junction with the main. At the point where the mole drain is to start a hole or " eye " is dug; the coulter with the plug attached is dropped into this and the plough drawn along the line of the proposed drain. The tunnel produced is very similar to a mole's "run," and if the subsoil is of the right texture and moistness, an efficient drain is obtained. The disturbance caused by the coulter itself is very small and as a rule the cut soon closes up. Even when a crop is being grown on the land the work can be done without causing any very serious damage.

The main drains should be run along the bottom of the field, or, in the case of an uneven field, along the hollows. As an emergency measure main drains can be made by the mole plough and connected with a boundary ditch, or the minor drains can be run direct into a ditch, the laying of pipes being deferred until after the War.

The mole drains are usually made 2 ft. or 2 ft. 3 in. in depth and 7 or 8 yd. apart, though in many cases the distance between the drains is determined by the width of the ridges.

The work can be done only when the surface is sufficiently dry to carry the tackle and when the subsoil is moist; on this account it is usually performed in April or May.

Obviously the system is only of value under certain conditions—the subsoil must be a fairly stiff clay or the holes made by the plug will soon fill up; there must be few, if any, stones so large that they cannot be turned aside by the coulter; and the ground must not be too uneven, as the drain will follow the inequalities of the surface. If the field is laid up in ridges and furrows the drains must follow the line of the furrows and not run across them.

In Essex, where a good deal of mole drainage is performed annually, it is the custom for the tenant to carry out the work and the landlord to find the pipes for the main drains. In cases where the tenant leaves his farm after doing the work compensation is generally given on a basis of three to six years.

The Executives of War Agricultural Committees may be authorised by the Board to undertake the work, and wherever possible, they should arrange with the tenant to pay the cost. It will be found convenient in many cases to agree with the tenant that payment should be spread over a period not exceeding five years. Where the tenant will not agree to pay the cost, the Committee should enter and take possession of the land and carry out the work, afterwards recovering the value of the work done under Para. (4) of Regulation 2M, in a manner similar to that suggested with regard to manuring in Para. (15) of the Board's Circular A 290/C, dated 23rd January, 1917.

Feeding of Poultry.

Since the Board's poultry leaflets were prepared the question of the Food Supply of the Nation has become so serious that it is necessary to reserve sound corn (wheat, barley, rice, and maize) for human consumption to the utmost extent possible, and oats not taken for human food must be reserved for horses. Poultry-keepers should, therefore, avoid using for their fowls wheat, barley, oats, rice and maize, or anything else which is suitable for human consumption.

See the more detailed suggestions below.

The President of the Board of Agriculture and Fisheries desires to call the attention of poultry-keepers to the following suggestions for economy in feeding stuffs, the necessity of which he has already pointed out.

In considering the desirability of any industry connected with the production of food one criterion is paramount: Does the industry really increase the national food supply? When the poultry industry is tested in this way the following results are reached:—

An average pullet in the first 18 months of her life consumes 100 lb. of corn and meal, or their equivalent, lays about 180 eggs, and if killed weighs about 4½ lb. The dry edible human food contained in her carcass and in the eggs she has laid amounts to about 6½ lb., so that she has consumed about 15 lb. of corn and meal, or their equivalent, for every pound of dry edible human food she has produced.

If the corn and meal she consumes are fit for human food, then the result is to decrease the national food supply. If she is fed on scraps, waste, tail corn, or other materials not fit for human food, then the national food supply is increased.

Applying the same test to other kinds of live stock it appears that pigs are rather more economical from the national point of view than poultry.

The President, therefore, makes the following suggestions to poultry-keepers:—

(1) Where poultry are kept in such small numbers that they can live almost entirely on scraps, waste products, tail or damaged corn, and other materials quite unfit for human food, they should be encouraged, because they increase the national food supply.

(2) Where, however, the amount of scraps and waste products is sufficiently large to feed a pig, the pig should be kept in preference to poultry, because the pig is a more economical producer of human food.

(3) Where the quantity of poultry is too large to be fed as above, it must be remembered that the unproductive season is now passed and that laying hens will now be in full profit, and will produce on the average 1 egg, containing ½ oz. of dry human food, for every 2½ oz. of corn consumed. The waste is still considerable, for 5 oz. of corn are required to produce 1 oz. of dry human food, but if every effort is made to use foods which are unfit for human consumption, such as tail corn, fish meal, the coarser wheat offals, etc., and to avoid using maize, sound oats, barley or wheat, egg-producing establishments should keep their hens until the present laying season is over. After about July, stocks should undoubtedly be reduced until such time as corn again becomes plentiful.

(4) Establishments concerned in the production of table poultry, expecially those which specialise in fattening and cramming, should limit their activities to such an extent as is compatible with the condition of using no corn or meal fit for human consumption.

(5) Breeding establishments should also be curtailed, for the number of fowls in the country must be decreased because of the shortage of suitable feedings tuffs.

Use of Surplus Brewers' Yeast for Stock Feeding.

THE attention of the Board has been directed to the possible utilisation as food for stock of the surplus yeast of the breweries which is at present being thrown away.

In a few of the larger breweries the surplus yeast is dried artificially in plant specially designed for the purpose, and the product is being successfully used for stock feeding under the name of "dried yeast." The composition varies according to the kind of yeast, but average samples contain 45 to 50 per cent. of albuminoids, 1 to 3 per cent. of oil, and 25 to 30 per cent. of carbohydrates. Where the surplus of yeast is sufficient to warrant the necessary outlay on drying plant, this method is undoubtedly the most satisfactory mode of preparing the yeast for use as food for stock.

Where the supplies do not warrant this expenditure, the yeast can be most conveniently sent out in compressed form, containing 75 to 85 per cent. of moisture. Before this can safely be fed to stock, however, it must be well steamed or boiled in order to ensure complete destruction of the vitality of the yeast. It can then be fed at the rate of 5 to 10 lb. per day in admixture with chaffed hay or straw to milch cows or fattening bullocks, or to pigs at the rate of 1 to 3 lb. per day, according to size. The yeast must be in fresh, unfermented condition; samples showing any sign of putrefaction must be strictly avoided. If the yeast is strongly contaminated with hop resin it should be washed with water at the brewery before compressing. Where facilities for drying are available the yeast may be mixed before drying with straw chop, ground tail corn and other materials which will facilitate the drying and give a useful mixed food. Good results are said to have been obtained with cakes prepared in this way from a mixture of 100 parts yeast, 25 to 30 parts pressed spent hops, 1 to 2 parts fine straw chop, and 2 parts of salt, and also with similar cakes made from a mixture of equal parts of pressed yeast and barley. It is reported that cows and young cattle took the yeast cakes readily in admixture with other foods, and gave very satisfactory results. Efficient drying and fresh, sound yeast are essential. It is suggested that farmers might direct the attention of the smaller breweries to the possibility of using their surplus yeast and other waste in this manner.

Notes on Feeding Stuffs in May: *From the Animal Nutrition Institute, Cambridge University.*

SINCE last month prices have risen all round. In most cases the rise has been about 1*d.* per unit. Cakes have risen rather more, from 2*d.* to 4*d.* per unit. The greatest advance is shown by treacle and distillers' grains.

Farmers should interpret this general rise in price as a further warning of the decrease in quantity of feeding stuffs, which must get more and more acute as time goes on. It is to be hoped that every owner of live stock will endeavour to act up to the spirit of the manifesto* issued by the President of the Board of Agriculture, which means an adequate but not excessive ration of concentrated food for working horses and milking cows, and a minimum of concentrated food for all other kinds of stock, including fattening cattle, sheep, pigs, and poultry.

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* This has been reprinted as Special Leaflet, No. 76, a copy of which may be obtained gratis and post free on application to the Board, 3, St. James's Square, London, S.W. 1.

It is, perhaps, hardly justifiable to use the term "fattening" at all, for what is commonly known as fattening must be discontinued. Any owner of live stock who uses concentrated food in ordinary quantities for fattening purposes, is either robbing milking cows or horses, or using more than his fair share, so that other owners of live stock must go short. If the practice of fattening continues, the Government may be compelled to take some kind of action to prevent it, such as, for example, the fixing of such maximum prices for meat as would make fattening unremunerative.

Horses.—No horse, that is not doing productive work, should get any corn at all. Farm horses should go out to

TABLE I.

Feeding Stuff.	Digestible Food Units.	Approximate Prices per ton at the end of March.					
		London.	Liverpool.	Hull.	Bristol.	Glasgow.	Leith.
		£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d	£ s. d.
Soya Bean Cake	122·3	19 10 0	—	—	—	—	—
Decorticated Cotton Cake	126·3	19 0 0	19 15 0	—	20 0 0	—	—
Decorticated Cotton Meal	126·3	19 0 0	—	—	—	—	—
American Linseed Cake	119·0	20 5 0	—	—	—	—	—
Indian Linseed Cake	123·1	—	20 15 0	—	—	20 0 0	20 5 0
Russian Linseed Cake	123·5	—	—	—	—	—	—
English Linseed Cake	120·1	20 15 0	21 0 0	20 0 0	20 15 0	20 10 0	20 10 0
Bombay Cotton Cake	65·3	15 0 0	16 10 0	—	—	—	—
Egyptian Cotton Cake	71·9	16 0 0	17 0 0	15 10 0	16 5 0	16 0 0	16 0 0
Coconut Cake	102·6	—	—	—	—	—	—
Palm Kernel Cake	96·1	15 10 0	15 15 0	14 10 0	15 10 0	16 0 0	‡16 5 0
Palm Kernel Meal (extracted)	92·5	15 5 0	—	—	—	—	—
Ground-nut Cake	145·2	18 10 0	—	17 10 0	—	—	—
English Beans	99·5	18 2 1	20 15 4	19 7 4	—	—	—
Bean Meal	99·5	—	—	—	—	—	—
Chinese Beans	101·2	Nominal.	—	—	—	—	—
English Maple Peas	97·2	20 0 0	—	22 4 5	—	—	—
English Dun Peas	97 2	17 15 6	—	18 17 9	—	—	—
Calcutta White Peas	97·5	20 11 1	—	—	—	—	—
American Maize	93·8	16 18 4	—	—	—	} —	20 10 0
Argentine Maize	94·2	18 13 4	—	—	17 19 4		
Maize Meal	86·5	18 0 0	18 10 0	19 5 0	18 0 0	—	21 0 0
Maize Gluten Feed	121·6	16 3 9	18 0 0	—	17 10 0	—	—
Maize Germ Meal	99·2	17 2 6	18 7 6	—	18 0 0	—	—
English Feeding Barley	83·0	18 4 0	—	18 4 0	—	—	—
English Oats	75·4	21 13 4	—	19 15 0	19 10 0	} 19 15 0	—
Argentine Oats	75·4	23 11 7	—	—	—		
Malt Culms	69·9	13 2 6	—	11 0 0	12 0 0	13 10 0	15 10 0
Brewers' Grains (dried)	84·5	15 5 0	—	14 0 0	15 0 0	15 0 0	—
Brewers' Grains (wet)	21·1	2 10 0	—	2 0 0	—	—	—
Distillers' Grains (English)	101·2	15 5 0	—	—	15 10 0	} 15 5 0	15 10 0
Distillers' Grains (French)	101·2	15 10 0	—	—	—		
Distillery Mixed Grains (wet)	20·0	—	—	—	—	—	—
Egyptian Rice Meal	78·7	Nominal.	—	—	—	—	—
Burmese Rice Meal	78·7	Nominal.	—	—	—	—	—
Rice Bran	78·7	—	—	—	—	—	—
Wheat Middlings (coarse)	94·8	14 5 0	—	—	—	16 0 0	15 5 0
Wheat Sharps	90·5	14 15 0	15 10 0	14 15 0	15 5 0	15 5 0	14 10 0
Wheat Pollards	96·7	—	14 10 0	—	—	—	—
Wheat Bran	77·5	12 0 0	—	14 5 0	13 10 0	15 10 0	14 0 0
Wheat Bran (broad)	79·9	13 0 0	14 15 0	16 5 0	14 7 6	15 15 0	15 0 0
Feeding Treacle	60·0	18 0 0	19 0 0	—	—	21 10 0	23 0 0
Linseed	153·5	31 0 0	*35 0 0	32 6 2	32 0 0	—	31 10 0
Linseed Oil	250·0	56 0 0	†56 0 0	52 0 0	4/6 *per gal.*	—	—
Egyptian Cotton Seed	108·6	19 0 0	—	20 7 6	—	—	—
Bombay Cotton Seed	99·6	—	—	—	—	—	—
Cotton Seed Oil	250·0	58 5 0	†70 0 0	—	—	—	—
Fish Meal	145·0	—	—	—	—	14 10 0	15 10 0
Locust Bean Meal	80·0	—	—	—	—	—	—

* Cleaned. † In barrels. ‡ Carriage paid to any station.

TABLE II.

LONDON. PRICES PER FOOD UNIT.

	s.	d		s.	d.
Brewers' grains (wet) ..	2	4½	Brewers' grains (dried) ..	3	7¼
Ground nut cake ..	2	6¼	American maize ..	3	7¼
Maize gluten feed ..	2	8	English beans	3	7¾
Decorticated cotton cake	3	0	English dun peas ..	3	8
Decorticated cotton meal	3	0	Malt culms	3	9
Distillers' grains (English)	3	0¼	Argentine maize ..	3	11½
Distillers' grains (French)	3	0¾	Linseed	4	0¾
Wheat middlings (coarse)	3	1¼	English maple peas ..	4	1¾
Wheat bran	3	1½	Maize meal	4	2
Soya bean cake	3	2¼	Calcutta white peas ..	4	2¾
Palm kernel cake ..	3	2¾	English feeding barley ..	4	4½
Wheat sharps	3	2¾	Egyptian cotton cake ..	4	5½
Wheat bran (broad) ..	3	3	Linseed oil	4	6
Palm kernel meal ..	3	3½	Bombay cotton cake ..	4	7¼
Coconut cake	3	4½	Cotton seed oil	4	8
American linseed cake ..	3	4½	English oats	5	8¾
English linseed cake ..	3	5¼	Feeding treacle	6	2
Maize germ meal ..	3	5½	Argentine oats	6	3
Egyptian cotton seed ..	3	6			

TABLE III.

LIVERPOOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Maize gluten feed ..	2	11¾	English beans	4	2¼
Decorticated cotton cake	3	1½	Maize meal	4	3¼
Palm kernel cake ..	3	3¼	Linseed oil	4	6
Wheat pollards	3	4	Linseed	4	6¾
Indian linseed cake ..	3	4½	Egyptian cotton cake ..	4	8¾
Wheat sharps	3	4½	Bombay cotton cake ..	5	0½
English linseed cake ..	3	6	Cotton seed oil	5	7
Maize germ meal ..	3	8¼	Feeding treacle	6	3¼
Wheat bran (broad) ..	3	8½			

TABLE IV.

HULL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet) ..	1	10¾	English dun peas ..	3	10½
Ground nut cake ..	2	5	Wheat bran (broad) ..	4	1
Palm kernel cake ..	3	0¼	Linseed oil	4	2
Malt culms	3	2	Linseed	4	2¾
Wheat sharps	3	2½	Egyptian cotton cake ..	4	3½
Brewers' grains (dried) ..	3	3¾	English feeding barley ..	4	4¾
English linseed cake ..	3	4	Maize meal	4	5½
Wheat bran	3	8¾	English maple peas ..	4	6¾
Egyptian cotton seed ..	3	9	English oats	5	2¾
English beans	3	10¼			

TABLE V.

BRISTOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Maize gluten feed ..	2	10½	Brewers' grains (dried)..	3	6½
Distillers' grains (English)	3	0¾	Wheat bran (broad) ..	3	7¾
Decorticated cotton cake	3	2	Maize germ meal ..	3	7½
Palm kernel cake ..	3	2¾	Argentine maize.. ..	3	9½
Wheat sharps	3	3½	Maize meal	4	2
Malt culms	3	5¼	Linseed	4	2¼
Coconut cake	3	5½	Egyptian cotton cake ..	4	6¼
English linseed cake ..	3	5½	English oats	5	2¼
Wheat bran	3	5¾			

TABLE VI.

AVERAGE PRICES PER FOOD UNIT.

LONDON, LIVERPOOL, HULL AND BRISTOL.

	s.	d.		s.	d.
Brewers' grains (wet) ..	2	1¾	Maize germ meal ..	3	7
Ground nut cake ..	2	5¾	American maize ..	3	7¼
Maize gluten feed ..	2	10	Egyptian cotton seed ..	3	7½
Decorticated cotton meal	3	0	Wheat bran (broad) ..	3	8
Distillers' grains (English)	3	0½	English dun peas ..	3	9¼
Decorticated cotton cake	3	1	Argentine maize.. ..	3	10½
Wheat middlings (coarse)	3	1¼	English beans	3	10¾
Palm kernel cake ..	3	2¼	Calcutta white peas ..	4	2¾
Soya bean cake	3	2¼	Maize meal	4	3¼
Wheat sharps	3	3¼	Linseed	4	3¼
Palm kernel meal ..	3	3½	English maple peas ..	4	4
Wheat pollards	3	4	English feeding barley ..	4	4½
Indian linseed cake ..	3	4½	Linseed oil	4	4¾
American linseed cake ..	3	4½	Egyptian cotton cake ..	4	6
Coconut cake	3	4¾	Bombay cotton cake ..	4	10
Wheat bran	3	5	Cotton seed oil	5	1½
English linseed cake ..	3	5¼	English oats	5	6½
Malt culms	3	5¼	Feeding treacle	6	2¾
Brewers' grains (dried) ..	3	5¾	Argentine oats	6	3
Distillers' grains (French)	3	6¾			

TABLE VII.

GLASGOW. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	0	Brewers grains (dried)	3	6½
Distillery mixed grains (dried)	3	0¼	Malt culms ..	3	10½
Indian linseed cake ..	3	3	Wheat bran (broad) ..	3	11½
Wheat sharps	3	3¾	Wheat bran	4	
Palm kernel cake ..	3	4	Egyptian cotton cake ..	4	5½
English linseed cake ..	3	5	Oats	5	2¾
Wheat mid lings ..	3	5¾	Feeding treacle	7	2¼

TABLE VIII.

LEITH. PRICES PER FOOD UNIT.

	s	d		s.	d.
Fish meal	2	1¾	Wheat bran	3	7¼
Distillery mixed grains (dried)	3	0¾	Wheat bran (broad) ..	3	9
Wheat sharps	3	2	Crushed linseed	4	1½
Indian linseed cake ..	3	3½	Maize	4	4¾
Wheat middlings ..	3	3¾	Malt culms	4	5½
Palm kernel cake ..	3	4¾	Egyptian cotton cake ..	4	5¼
English linseed cake ..	3	5	Maize meal	4	10½
			Feeding treacle	7	8

TABLE IX.

AVERAGE PRICES PER FOOD UNIT.

GLASGOW AND LEITH.

	s.	d.		s.	d.
Fish meal	2	1	Wheat bran	3	9½
Distillery mixed grains (dried)	3	0½	Wheat bran (broad) ..	3	10½
Wheat sharps	3	3	Crushed linseed	4	1½
Indian linseed cake ..	3	3½	Malt culms	4	1¾
Palm kernel cake ..	3	4½	Maize	4	4¾
Wheat middlings ..	3	4¾	Egyptian cotton cake ..	4	5½
English linseed cake ..	3	5	Maize meal	4	10½
Brewers' grains (dried) ..	3	6½	Oats	5	2¾
			Feeding treacle	7	5

grass as soon as possible. Meantime, the following foods in order of cheapness may be used to replace oats, which have risen more than 6*d*. per unit since last month: maize gluten feed, wheat pollards or bran, linseed cake, malt culms, brewers' or distillers' grains, maize germ meal. The ration suggested last month may be repeated:—

3 lb. dried brewers' or distillers' grains.
5 „ pollards or 6 lb. bran.
1 „ gluten feed.
1 „ linseed cake.

This ration is equivalent to 12 lb. of oats.

Milking Cows.—The ration suggested last month—2 lb decorticated cotton cake and 3 lb. gluten feed—may be continued until cows go out to grass. For the first fortnight or so after they go out it is advisable to give 2 lb. of cotton cake per head per day. Despite its high price, cotton cake is worth using for this purpose because it prevents scouring on the young grass.

Cattle for Beef Production.—Two-year-olds on good grass land which will normally fatten them should get no cake.

Similar cattle on grass, not good enough to fatten, should get no cake until the aftermath comes, when they may get a small allowance.

Older cattle should run on the poorer grass all the summer and finish on roots and straw with a little cake, if there is still any available next winter.

Yearlings in fresh condition should get 2 or 3 lb. of cake per head per day in May and June, so that they may come to the

TABLE X.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Name of Feeding Stuff.	Nutritive Ratio.	Per cent. digestible.			Starch equiv. per 100 lb.	Linseed Cake equiv. per 100 lb.
		Protein.	Fat.	Carbo-hydrates and Fibre.		
Foods rich in both Protein and Oil or Fat.						
Ground nut cake	1 : 0·8	45·2	6·3	21·1	77·5	102
Soya bean cake	1 : 1·1	34·0	6·5	21·0	66·7	88
Decort cotton cake ..	1 : 1·2	34·0	8·5	20·0	71·0	93
Linseed cake, Indian ..	1 : 1·9	27·8	9·3	30·1	77·1	101
Linseed cake, English ..	1 : 2·0	26·7	9·3	30·1	76·0	100
Cotton cake, Egyptian ..	1 : 2·1	15·5	5·3	20·0	40·0	53
Cotton cake, Bombay ..	1 : 2·5	13·1	4·4	21·5	37·6	49
Distillers' grains (English) .. Distillers' grains (French) ..	1 : 2·9	18·7	10·2	29·0	57·3	75
Maize gluten feed	1 : 3·0	20·4	8·8	48·4	87·4	115
Brewers' grains, dried ..	1 : 3·5	14·1	6·6	32·7	50·3	66
Coconut cake	1 : 3·8	16·3	8·2	41·4	76·5	101
Palm kernel cake	1 : 4·5	14·1	6·1	48·9	76·7	101
Linseed	1 : 5·9	18·1	34·7	20·1	119·2	157
Bombay cotton seed ..	1 : 6·6	11·0	16·8	30·1	77·5	102
Fairly rich in Protein, Rich in Oil.						
Maize germ meal	1 : 8·5	9·0	6·2	61·2	81·0	107
Rice meal	1 : 9·4	6·8	10·2	38·2	68·4	90
Rich in Protein, Poor in Oil.						
Fish meal	1 : 0·1	54·0	4·0	—	60·0	78
Peas, Calcutta white ..	1 : 2·1	23·3	1·1	45·9	66·9	88
Beans, English	1 : 2·6	19·3	1·2	48·2	67·0	88
Beans, Chinese	1 : 2·6	19·6	1·7	47·9	67·0	88
Peas, English maple ..	1 : 3·1	17·0	1·0	50·0	70·0	92
Palm-nut meal (extracted)	1 : 3·4	15·6	1·9	48·7	66·1	87
Brewers' grains, wet ..	1 : 3·5	3·5	1·5	8·6	12·7	17
Malt culms	1 : 3·6	11·4	1·1	35·6	38·7	51
Cereals, Rich in Starch, not Rich in Protein or Oil.						
Barley, feeding	1 : 8·0	8·0	2·1	57·8	67·9	89
Oats, English	1 : 8·0	7·2	4·0	47·4	59·7	79
Oats, Argentine	1 : 8·0	7·2	4·0	47·4	59·7	79
Maize, American	1 : 11·5	6·7	4·5	65·8	81·0	107
Maize, Argentine	1 : 11·3	6·8	4·5	65·8	83·5	110
Maize meal	1 : 13·0	5·5	3·5	63·9	77·8	102
Wheat middlings, fine ..	1 : 4·8	13·2	3·0	53·8	72·0	95
Wheat middlings, coarse or sharps	1 : 5·1	13·8	4·3	50·5	64·0	84
Wheat pollards	1 : 4·5	11·6	4·0	51·6	60·0	79
Wheat bran	1 : 4·7	11·3	3·0	45·0	49·7	65
Wheat bran, broad	1 : 4·7	11·3	3·0	45·4	48·1	63
Locust bean meal	1 : 22·1	4·0	0·7	69·2	71·4	94

butcher in July. They should start on cotton cake, which may be gradually replaced by ground nut cake or palm kernel cake. Yearlings in poor condition should get no cake until the autumn. A small allowance of cake during September and October will bring most of them to the butcher by the end of the latter month. The rest can be kept over the winter on grass with a little hay, for grazing in the summer of 1918.

Sheep should be dealt with on the same general lines as above.

Wether lambs, born early, should get a very small allowance of cake, ground nut or linseed, not more than ¼ lb. per head per day, and should go to the butcher as soon as they reach 120 to 130 lb. live weight.

Later lambs should run on grass with no cake until they go on to the roots next October.

Pigs have been dealt with fully in the last three months' notes, to which readers are referred.

Notes on Manures in May:
From the Rothamsted Experimental Station.

THE time for applying fertilisers is now over for most of the ordinary crops, but there are two points to which attention ought to be given.

1. Careful note should be made of the effects of the fertilisers used with a view to improving the manurial scheme next year.

2. In view of difficulties of manufacturing, transport, etc., orders for next season's fertilisers should be placed during this season.

The difficulty of preparing adequate amounts of superphosphate last season led to experiments with mineral phosphates alone, and with mixtures of mineral phosphates and superphosphates. These experiments have not gone on long enough to yield very definite conclusions, but certain general points are indicated which may now be set out.

The chief experiments have been made at Cockle Park, Bangor, Aberdeen, and in Ireland.

On Grass Land.—In the Cockle Park experiments both Tunisian and Belgian phosphates proved satisfactory on a three years' grass ley. The following results were obtained :—

*Cockle Park. Three years' Grass Ley. Yield of Hay, cwt. per acre.**

—	1st Test, 1911–13.				2nd Test, 1912–14.				3rd Test, 1913–15.			
	1st Year 1911	2nd Year 1912	3rd Year 1913	Average.	1st Year 1912.	2nd Year 1913	3rd Year 1914.	Average.	1st Year 1913.	2nd Year 1914.	3rd Year 1915.	Average.
Unmanured	18¾	35	46	33¼	33¾	42	24	33¼	33½	37½	22	31
Basic slag	25½	42	50¼	39⅓	35¼	48¼	35	39½	44¼	48¼	27½	40
Tunisian rock phosphate	26¾	36½	49¾	37⅔	35¼	49½	32¼	39	35	41½	30½	36
Belgian rock phosphate alone	—	—	—	—	35¼	50½	34¼	40	41	39½	29	36
Belgian rock phosphate + superphosphate ..	—	—	—	—	37¾	52¼	36	42	—	—	—	—

* Cockle Park Bull. 24, 1916, pp. 34–40.

The slag and phosphatic rocks each contained 200 lb. of phosphoric acid per acre, corresponding to nearly 10 cwt. of 41 per cent. basic slag; in the last plot on the list the mixture contained equal parts of phosphoric acid in the form of rock phosphate and of superphosphate. Another experiment indicated that the Belgian phosphate did even better when it was calcined. The results are distinctly promising and show that mineral phosphates may prove of considerable value on grass land.

It is very desirable that these experiments should be repeated elsewhere on poor grass land. These mineral phosphates contain a good deal of calcium carbonate, and they are, of course, considerably cheaper than slag; in this case the phosphate of lime cost only 9*d*. per unit against 1*s*. 3*d*. in basic slag.

Tests have been made with meadow hay at 31 centres in 22 counties in Ireland.† The results per acre were:—

No phosphate	52¾ cwt. of hay.
3 cwt. Tunisian phosphate	59 ,, ,,
3 ,, Tunisian phosphate + superphosphate (2 : 1)	63½ ,, ,,
3 ,, superphosphate	63¾ ,, ,,

In all four cases 1 cwt. of nitrate of soda was applied to the land.

Swedes and Turnips.—Both at Aberdeen and in North Wales mineral phosphates have given good results with swedes. At Aberdeen‡ the yields were:—

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† A.B. Memo. No. 4, 1917. ‡ Aberdeen and N. of Scotland Bull. 10, 1909.

	Tons	cwt.
No manure	16	18½
Florida phosphate	19	18
Superphosphate	22	1¼

The rock phosphate is thus not as good as superphosphate; observation showed that the braird was very much behind that obtained with superphosphate or slag. Other experiments indicate, however, that an addition of superphosphate to the rock phosphate gets over this difficulty, and thus considerably increases its value. Thus at Balblair the following results were obtained :—*

	Yield of Turnips.	
	Tons	cwt.
Mineral phosphates (5½ cwt.)	13	19
Mineral phosphates (5½ cwt.) + superphosphate (2¼ cwt.)	16	13
Superphosphate (7 cwt.)	16	6

The same basal dressing was given in each case.

In the North Wales experiments† the mineral phosphate (Gafsa) acted almost as well as superphosphate, and the conclusion is drawn that, if finely ground, mineral phosphate may without hesitation be tried for swedes.

Potatoes.—The Irish experiments made at 42 centres in 25 counties show that mineral phosphates produce only a small effect, but when mixed with superphosphate they produce nearly as large an increase as unmixed superphosphate. Thus the following yields were obtained when phosphates were added to a basal dressing of dung and sulphate of ammonia :—

	Saleable.			Total Yield.	
	Tons	cwt.		Tons	cwt.
No phosphate	6	5	..	8	4
4 cwt. Tunisian phosphate ..	6	11	..	8	11¾
4 „ Tunisian phosphate + superphosphate (2 : 1) ..	7	3	..	9	4¾
4 „ superphosphate ..	7	9	..	9	11¾

Mangolds.—Again we have to turn to Ireland for published information. The following results are recorded, the basal dressings being as before—dung + sulphate of ammonia :—

	Tons	cwt.	
No phosphate	30	12	per acre.
4 cwt. Tunisian phosphate	33	7	„
4 „ Tunisian phosphate + superphosphate (2 : 1)	34	17	„
4 „ superphosphate	34	17	„

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* Aberdeen and N. of Scotland Leaflet 51.

† Bull. 6, 1914.

Further experiments are desirable. The evidence is open to criticism, but on the whole it indicates that supplies of superphosphate can be eked out by mixing with mineral phosphate. The superphosphate gives the young plant a start, and the mineral phosphate can be taken up later on and more slowly as the root system develops. It is hoped that this mixture will not long have to be used, but at any rate it appears to tide over one of the difficulties of the situation. More information will be available before next season's manurial scheme is needed.

Unit Prices of Artificial Manures in May.—The statement on p. 201 shows the cost to the purchaser of 1 per cent. per ton of nitrogen, and soluble and insoluble phosphates derived from various sources, at certain ports and manufacturing centres, for May, 1917.

NOTE.—These unit prices are based on the *probable* retail cash prices in bags f.o.r. for quantities of not less than 2 tons of the manures mentioned at the ports and places specified, but it should be borne in mind that market prices are fluctuating considerably at the present time. The pricks are published by the Board of Agriculture and Fisheries for use in comparing the commercial values of artificial manures. They may also be used as a guide to the probable price per ton of any of the manures mentioned if the unit prices of the constituents of the manure are multiplied by the percentages of the constituents found in it, and due allowance is made for the difference between cash prices and credit prices, and for cost of carriage from the nearest centre to the place where it is delivered to the purchaser. If used in connection with the valuation of a compound manure regard must be had to the sources of the constituents, and a reasonable sum must be added for mixing, disintegrating, and rebagging the ingredients, bags, and loss of weight.

UNIT PRICES OF ARTIFICIAL MANURES.

—	England and Wales.										Scotland.	
	London.	King's Lynn.	Hull	Newcastle.	Silloth.	Liverpool.	Widnes.	Newport.	Bristol	Plymouth.	Glasgow.	Leith.
Nitrogen from :	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Sulphate of Ammonia pure .. 95 %	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 4½	15 6	15 6
Sulphate of Ammonia pure .. 93 %	—	—	—	—	—	—	—	—	—	—	—	—
Calcium Cyanamide (Nitrolim)	20 8	—	—	—	—	—	—	—	—	20 0	—	—
Nitrate of Soda pure 95 %	—	—	28 10	—	—	30 8	31 9	—	29 8	29 0½	—	29 8
Nitrate of Soda pure .. 90 %	28 10	—	—	—	—	—	—	—	30 8	—	—	—
Nitrate of Lime ..	—	—	—	—	—	—	—	—	—	—	—	—
Castor Meal	—	—	24 2½	—	—	—	—	—	—	—	—	—
Allowed for Insol Phos	—	—	*2 0*	—	—	—	—	—	—	—	—	—
Allowed for Potash ..	—	—	*15 0*	—	—	—	—	—	—	—	—	—
Soluble Phosphates from :												
Superphosphate 35 %	3 11	—	3 6	4 0	4 0	4 0	3 11	—	—	—	—	—
,, 33 %	3 11½	—	3 5	—	—	4 0	3 11½	4 2	—	—	—	—
,, 30 %	4 2½	—	3 6	3 10	4 1	4 1	4 0	4 1	4 1	4 1	—	4 6
,, 26 %	4 6	—	3 10	4 3	4 5	4 6	4 6	—	—	4 4	—	—
Dissolved Bones ..	6 2½	—	5 3½	5 7	5 4	—	—	6 2	6 4	6 1½	—	—
Allowed for Nitrogen .	*22 0*	—	*18 9*	*19 10*	*18 11*	—	—	*21 10*	*22 5½*	*21 8*	—	—
Allowed for Insol Phos.	*3 5½*	—	*2 11½*	*3 1½*	*2 11½*	—	—	*3 5*	*3 6½*	*3 5*	—	—
Insoluble Phosphates (Citric Soluble) from												
Basic Slag	2 8	2 7½	2 11	—	—	2 6½	—	—	3 6	3 6½	3 3½	3 3½
Insoluble Phosphates from :												
Basic Slag	2 4	—	2 3½	2 0	—	—	—	—	—	3 0	—	—
Bone Meal	3 0½	—	3 6½	—	2 10	3 1½	3 0	2 11½	3 1½	3 2½	—	—
Allowed for Nitrogen ..	*19 4½*	—	*22 5½*	—	*18 1½*	*19 10*	*19 1*	*18 9*	*20 0*	*20 3½*	—	—
Steamed Bone Flour ..	2 11	—	2 11½	—	—	—	—	2 5½	2 8	2 9	—	—
Allowed for Nitrogen ..	*18 7*	—	*18 9*	—	—	—	—	*15 8*	*17 0*	*17 6½*	—	—
Fish Guano	—	3 10½	3 1	—	—	3 4	—	—	—	—	—	—
Allowed for Nitrogen ..	—	*24 9*	*19 6½*	—	—	*21 2½*	—	—	—	—	—	—
Potash	No quotations.											

Food Production Societies.

THE production of more food is one of the chief means of winning the War. The work of doing this must not be left exclusively to the farmer. Every small cultivator, gardener, allotment holder and cottage gardener can help.

In order to produce the maximum results all existing gardens must be cultivated and made to yield the highest possible results and, wherever possible, more land must be brought under garden cultivation.

To secure these ends, combined efforts on the part of villagers and of the residents in rural and urban districts are necessary.

One important means of bringing about this combination of effort lies in the formation of a Food Production Society in every village and urban district. Where such societies have been formed it has been found possible to do more than can be accomplished by individual effort.

In order to encourage the formation and promote the work of Food Production Societies, the Horticultural Section of the Food Production Department of the Board offers the following suggestions :—

The Work which Food Production Societies can do.—The work of a Food Production Society must vary according to the locality —for example, that which can be undertaken by a village society differs from that to be done by a society formed in an urban district.

Village Food Production Societies.—1. Make known to everybody the vital importance both of increased food production and of the economical use of food.

2. Secure that every existing garden plot and allotment is made as productive as possible.

Help cottagers who lack the labour to do it themselves to get their gardens or allotments dug. See that the gardens and allotments of men on military service are cultivated. When this involves expense, the actual cost may, in some instances, be recovered from the occupier who is unable himself to do the necessary work. Once the ground is dug the women and older children can look after the planting. In some districts school children are helping in this work, and it is often possible to obtain soldier labour from Labour Exchanges. Application should be made through the War Agricultural Committees for temporarily released soldier labour, or direct to the Commanding Officer of any local unit. When making application, state what labour is required and which scale of payment will be made. Soldier labour is paid for at the rate of 4*s.* per man per day, or 2*s.* 6*d.* if board and lodging are provided. Where voluntary part-time labour is available, organise it so that it may be used to the best effect.

3. Make out seed orders early in order to obtain at the lowest price and in good time the best varieties of seeds. If one order is made for each village the cost will be less than if everyone sends his own seed order.

4. Teach economy in the use of seeds, for the seeds of some kinds of vegetables are very scarce. Save seeds of scarlet runners, French beans and garden peas for planting next year.

5. Start a seed and potato "seed" fund in order to secure that next year the seed orders are placed early so that the best seeds may be obtained, and that Scotch and Irish potatoes, of kinds which do well in the neighbourhood, may be ordered well before planting time. Scotch or Irish seed potatoes give from ¼ to ½ bush. per 10 rods more potatoes than are produced by English-raised seed.

6. Provide for an inspection of tools. If any tools are worn out or unsuitable get people who can lend or give suitable tools to do so. Encourage the use of labour-saving garden tools, *e.g.* a Planet Junior Hoe, owned co-operatively, saves much labour in the garden.

7. Hold demonstrations showing the inexperienced how to use tools—for example. the spade and hoe.

8. Arrange with the Food Production Department for the spraying of potatoes in order to prevent loss of the crop from disease.

9. Provide for the fencing of all allotments and other garden ground.

10. Enlist the services of professional gardeners in the neighbourhood for the purpose of (1) advice and instruction; (2) raising supplies of good and suitable varieties of cabbage and other brassicas for distribution to cottagers and allotment-holders.

11. Encourage the best methods of cropping, intercropping and successional cropping (see the Royal Horticultural Society's pamphlets on "Cropping in Allotments and Small Vegetable Gardens," the "Cultivation of Potatoes," the "Cultivation and Manuring of Kitchen Gardens," and "Late Summer-sown Vegetables"; see also the Board's Leaflets, and their pamphlet *How to Manage an Allotment*, price 1*d.*, post free).

12. Encourage in particular the sowing in late summer (*e.g.* mid July) of crops which remain in the ground during the

winter and provide a useful supply of food during the winter and spring—beet, turnip, carrot, onion, cabbage, savoy and kale.

13. Provide not only for the needs of a village but aim at having a surplus, and before the crops are ready make arrangements for marketing the surplus or for preserving it for future use. "Standardize" those crops likely to yield a surplus for marketing, *i.e.* encourage the cultivation by everybody of *the same* varieties of each kind of vegetable, choosing those which are known to do well in the district, in order to obtain the best price for marketed produce.

14. Teach the importance of the proper clamping or storing of potatoes to prevent loss from frost, etc. (See the Board's Leaflet No. 296, *Potato Growing in Allotments and Small Gardens*.

15. Arrange for the purchase and distribution of manures. Encourage the economical and proper use of artificial manures.

16. Arrange with the Food Production Department for demonstrations in the preserving of fruit and vegetables.

17. Vegetable shows may be held if desired, but prizes should be given for the best cropped and most productive gardens, and not for the *biggest* vegetables. Encourage quality and quantity, not merely size.

18. Generally promote "small cultivation" in gardens and allotments, the keeping of bees and also animals for food purposes (pigs, rabbits, chickens, etc.).

Wherever possible, the Society should take up fresh land for cultivation, renting it from the parish council or from private owners. Such land may be either divided into allotment plots or cultivated on a co-operative system. *Ground for vegetables, even if not dug before early summer, may be used for late summer-sown crops.*

To Form a Village Food Production Society.—In parishes where no organisation of this kind exists the parish council should take the lead in establishing one, and in that case it should invite the co-operation of all members of the community, and not make a Food Production Society solely an official organisation. Failing the parish council, persons of influence, the clergy, other ministers of religion, the squire, the schoomaster, neighbouring gardeners should take the initiative, form a committee of men and women able to give time to the work, seek the active support of the local authority, and after making a preliminary draft of a scheme suitable to the village, call a meeting of residents in order to explain the objects of the proposed society and the way in which these objects may be attained. At the meeting the society should be constituted and the officers elected.

Horticultural Representatives.—The Food Production Department is appointing a horticultural representative in each rural and urban district. Where a district organisation for horticultural purposes already exists, it is hoped that the horticultural representative will be appointed from among its members and will continue to act with that organisation. The horticultural representatives will assist the Village Food Production Societies in carrying out their work, and in making their special requirements known to the Food Production Department.

The horticultural representatives should also co-operate with the county horticultural instructor or organiser.

The following leaflets may be had free by a Food Production Society or similar organisation on application to the Food Production Department :—

1. Urban Food Production Societies.
2. Economy in the Use of Seeds.
3. Potato Spraying (arrangements for spraying the potatoes grown by small cultivators in 1917).
4. Fruit and Vegetable Preserving (arrangements for providing instruction during the summer of 1917).
5. Free Advice by Garden Experts (The Royal Horticultural Society's Panel of Patriotic Gardeners).
6. Royal Horticultural Society's Pamphlets :—
    - *a.* The Cropping of an Allotment or Small Kitchen Garden.
    - *b.* The Cultivation and Manuring of the Kitchen Garden.
    - *c.* Autumn Vegetables.
    - *d.* Cultivation of Potatoes in Gardens and Allotments.

The Secretaries of all Food Societies, Allotment Associations and similar organisations are asked to communicate their names and addresses to the Director of Horticulture, Food Production Department, 72, Victoria Street, London, S.W. 1.

THE following suggestions have been drawn up with a view to helping those who are inexperienced in gardening :—

Gardens in War Time.

1. Vegetables should be grown instead of flowers, or at most only a small part should be devoted to flowers.

2. A small part of the garden, a warm corner well drained but not heavily manured, should be set aside for the purpose of seed saving.

Sow in this garden say, one dozen or more seeds of each of the following:—Scarlet runners, dwarf beans and haricot beans. Scarlet runners may be grown without stakes or poles. Sow the seed 2 ft. apart each way, and as soon as the point (the curling tip which makes the twining stem) is visible, pinch it out and similarly pinch out any branches which later on show signs of running. Do not pick any of the pods for eating purposes. When the pods are thoroughly ripe and beginning to turn yellow, pull up the plants and hang them in bundles in a warm, dry place. As soon as the pods are thoroughly dry they may be shelled, any bad seeds thrown away, and the good seeds spread on sheets of brown paper in a warm (but not hot), dry place. As soon as the pods are thoroughly dry they should be placed in paper bags or in seed packets, and kept in a cool, dry room.

3. To test germination of seed to be sown, place moistened, but not wet pieces of flannel or blotting paper in two saucers. Place in one of the saucers 20 or more seeds which have been soaked in water overnight Cover the saucer containing the seed with the other and place it in a warm room, taking care, however, that the flannel or other material does not get dry. Inspect daily, and as soon as a seed shows its root remove it, and after a time, varying according to the different seeds from a week or a fortnight, work out the percentage of germination. If the sample seeds have germinated well the remainder should be kept for next year.

Seed left over from last year should be tested and used in preference to this year's seed if it germinated fairly well.

4. All gardeners should exercise economy in seed sowing. Many gardeners sow seed too thickly. Seed is precious now and no more should be sown than is necessary. Before sowing, the number of plants required for the ground may usefully be estimated. A good rule is to sow no more than twice as many seeds as the number of plants required, although in the case of seeds which do not long retain their powers of germination (parsnips for instance), rather more should be sown.

5. Seed liable to be eaten by mice or birds should be moistened, rubbed in powdered red lead (a poison), and then planted.

6. Late summer sowing should be practised, and a good breadth of garden beet should be sown in the latter part of July or at the beginning of August, for winter use.

7. If expert advice is required and cannot be obtained locally, apply to The Secretary, Food Production Department, 72, Victoria Street, London, S.W. 1.

8. Any surplus which may be produced should not be wasted. Advice and assistance as to the disposal and preservation of surplus produce may be obtained on application to the Food Production Department if not available locally.

If advice on this and other subjects is required, it would be useful to ascertain first whether neighbouring allotment associations or other small cultivators require assistance also, so that a joint application for advice may be made, thus economising the time of the adviser who may be sent.

9. Onions and carrots should not be sown on freshly turned-up land.

10. Soot or lime dusted along the rows will help to keep down slugs.

11. Strands of black cotton stretched along the rows will protect seedlings from birds.

12. The tips of broad beans should be pinched out when the plants are about 2 ft. high, in order to lessen the effect of attack by aphis (black fly).

13. If space is limited and it is desired to use a lawn without destroying the grass, turves 1 ft. square may be taken out at intervals of 3 ft. The ground should be broken up with a fork, a little well-rotted manure added, and the surface raked, after which climbing French beans may be sown. When the seedlings appear, they should be staked. After the crop is gathered the turves may be replaced (these should have been laid in any convenient part of the garden), and in a month or two the lawn will be as good as ever.

14. Neighbouring gardeners should co-operate in making provision for the spraying of potatoes.

AN excellent scheme for food production by school children has been put in operation at Abergavenny.

Food Production by School Children.

Land to the extent of 24 acres has been rented, and practically every child in the higher departments of the public elementary schools has taken a row, 100 yards long, paying 7*s*., the estimated expenses, by 28 weekly instalments of 3*d*.

The childen are expected to set the potatoes, clear the rows before moulding, lift and pick the crop, and put it in bags; all other work, such as manuring, ploughing, moulding, and haulage into the town being done by the organisers.

1,100 rows have been taken under the scheme, and it is estimated that the average yield of potatoes per row will be 2½ cwt., and that the children's payments will cover the cost of seed, manure, labour, and the rent of the land.

Protection of Peas from Birds and Mice.

WHEN peas are sown thinly it is very important that every precaution should be taken to safeguard the seeds against the depredations of birds and mice.

The following methods of protection have been adopted with success:—

(1) Place the peas in a flower-pot after the central hole has been corked. Sprinkle the seeds with a very little pure paraffin to moisten them slightly, and apply a little red lead; if the flower-pot is then shaken the seeds will become completely coated with the red lead, and can be planted at once.

(2) Place 1 lb. of peas in a quart of water in which 1 oz. of bitter aloes* has been dissolved. Allow to stand for from 12–24 hours or longer according to the hardness of the peas. When the solution has been absorbed, the seeds are ready to plant and will be unpalatable to birds and mice.

(3) Peas may be sprayed with soapy water and bitter aloes if attacked by birds during the early stages of growth.

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* Bitter aloes may be obtained at present at from 1*s*. to 1*s*. 3*d*. per lb. In smaller quantities they would probably be obtained from chemists at 3*d*. per oz.

NAMES AND ROUTES OF THE SUPER, KING'S AND BOARD'S PREMIUM STALLIONS.

Particulars of the Routes of the Stallions to which Premiums have been awarded by the Board for the Service Season 1917, together with the names and addresses of the owners of the Stallions, and of the members of the Stallion Committees which have been appointed to supervise the service arrangements, are given below. The Routes are subject to some alteration by arrangement between the owners and the Stallion Committees.

The District Classes for England and Wales are as follow:—

District Class.	Counties.	Number of Premium Stallions.	
		King's and Super.	Board's.
1	Durham	1	1
	Northumberland	2	—
	York, N. Riding	2	3
2	Cumberland	1	—
	Lancaster	—	—
	Westmorland	1	—
3	York, E. Riding	4	—
	„ W. Riding	3	3
4	Lincoln, Parts of Holland ..	—	—
	„ „ Kesteven ..	1	—
	„ „ Lindsey ..	—	2
	Notts	2*	—
5	Derby	1	1
	Stafford	1	1
6	Chester	1	—
	Hereford	1	2
	Salop	1	2
7	Anglesey	1	—
	Brecknock	—	—
	Cardigan	—	—
	Carmarthen	1	—
	Carnarvon	—	—
	Denbigh..	—	—
	Flint	—	—
	Glamorgan	1	—
	Merioneth	—	—
	Monmouth	—	1
	Montgomery	1	1
	Pembroke	1	1
	Radnor	—	—

* Of which one stallion travels also in Kesteven.

District Class.	Counties.	Number of Premium Stallions.	
		King's and Super.	Board's.
8	GLOUCESTER	2	1
	OXFORD	—	1
	WARWICK	3	—
	WORCESTER	1	2
9	BEDFORD	1	—
	HUNTS	1	—
	LEICESTER	1	1
	NORTHAMPTON	2	1
	RUTLAND	—	1
	SOKE OF PETERBORO'	—	—
10	CAMBS	—	—
	ISLE OF ELY	—	—
	NORFOLK	2	2
	SUFFOLK	1	2
11	BUCKS	1	—
	ESSEX	2	—
	HERTS	—	1
	MIDDLESEX	—	—
12	KENT	1	1
	SURREY	1†	—
	SUSSEX, EAST	1	—
	„ WEST	1	1*
13	BERKS	2	—
	HANTS	1	2
	ISLE OF WIGHT	—	1
14	DORSET	1	1
	SOMERSET	3	1
	WILTS	2	—
15	CORNWALL	1	1
	DEVON	2	2
	Totals	60	40

* Travels also in Surrey. † Travels also in Sussex (East).

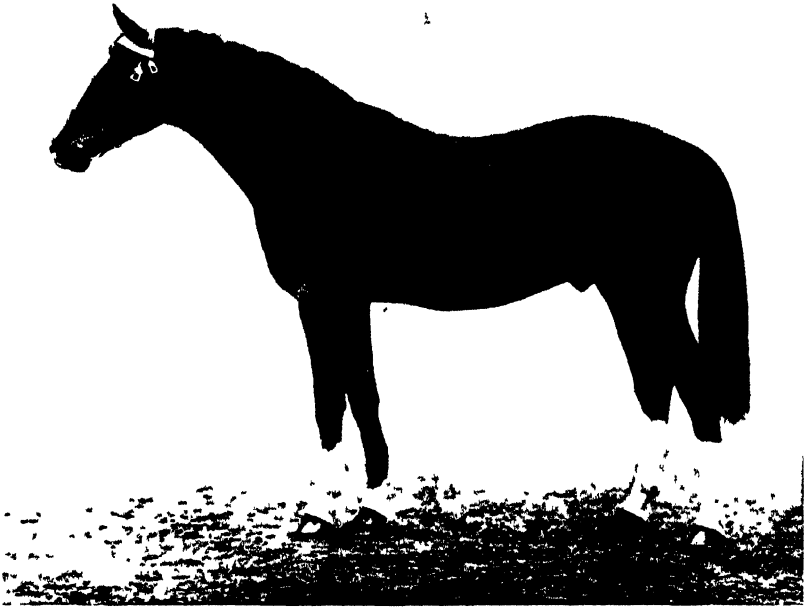

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FIG. 1.—**Rathurde.** Winner of the King's Champion Challenge Cup at the Show of Thoroughbred Stallions held at the Royal Agricultural Hall, Islington, on 28th February, 191

Owner.—Captain T. L. Wickham Boynton, Burton Agnes Stud, Driffield, Yorks.

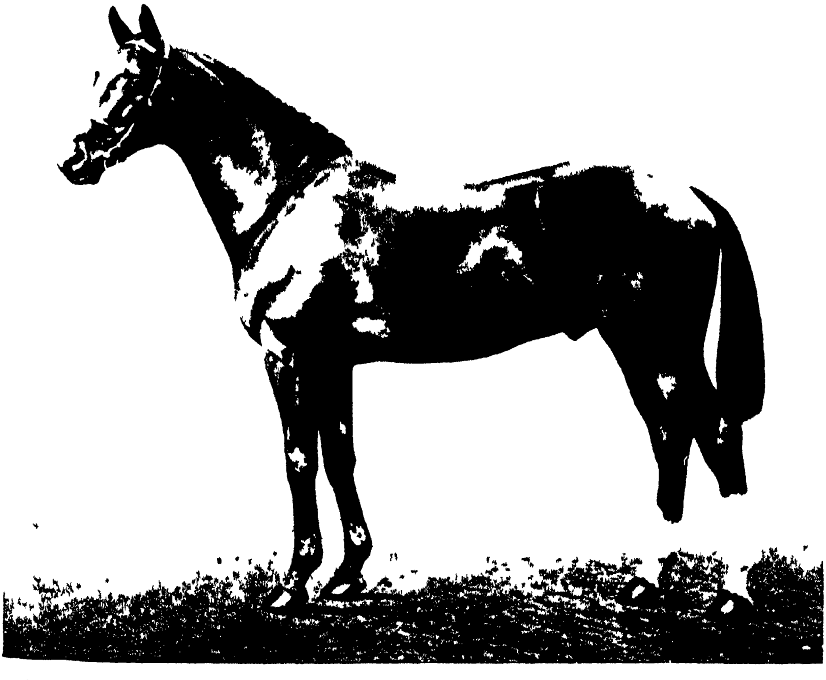

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FIG. 2.—**Gilgandra.** —Reserve to Winner of the King's Champion (photo above).
Owners.—The Compton Stud, Sandley, Gillingham, Dorset.

DISTRICT CLASS 1.

Durham, Northumberland, and York (North Riding).
5 King's Premiums and 4 Board's Premiums.

DURHAM.

Maitre Corbeau (King's Premium).

Owners :—Capt. T. L. Wickham-Boynton and Mr. H. A. Cholmondeley, Burton Agnes, Driffield.

Route :—Bishop Auckland, Sedgefield, Stockton, Wolviston, Elwick, Trimdon, Wingate, and Ferry Hill.

Committee :—

Mr. A. L. Greenwell, Windlestone, Ferry Hill.
Mr. S. Menzies, East Close Farm, Sedgefield, Ferry Hill.
Mr. R. Ord, Sands Hall, Sedgefield, Ferry Hill.
Mr. R. Watson, Long Newton, Stockton-on-Tees.

Désespoir (Board's Premium).

Owner :—Mr. F. Brownless, Hutton Henry, Castle Eden, Co., Durham.

Route :—Shotton Colliery, Haswell, Easington, Murton, Hetton-le-Hole, Houghton-le-Spring, Durham, Shincliffe, Cassop, Wheatley Hill, Hesledon, and West Hartlepool.

Committee :—

Mr. B. Brough, Seaton, near Seaham Harbour, Co. Durham.
Mr. W. M. Carr, Manor House, Easington Village, Co. Durham.
Mr. M. Clark, Pittington Hallgarth, Durham.
Mr. G. H. Forster, Biddick Hall, Fence Houses.
Mr. J. Murray, Pesspool Hall, Haswell, Sunderland.

NORTHUMBERLAND.

Darigal (Super Premium).

Owners :—The Compton Stud, Sandley, Gillingham, Dorset.

Route :—Alnwick, Warnford, Doddington, Pallinsburn, Wooler, and Powburn.

Committee :—

Mr. B. Clayhills, Estates Office, Callaley, Whittingham, Northumberland.
Mr. A. Fawcus, Louth Charlton Farm, Alnwick.
Mr. J. Patten, The Park Farm, Alnwick.
Mr. G. G. Rea, Doddington, Wooler, Northumberland.

Denis Richard (King's Premium).

Owner :—Mr. C. T. Maling, Haydon Kennels, Haydon Bridge, Northumberland.

Route :—Haydon Bridge, Wark, Barrasford, Stamfordham, Blaydon, Riding Mill, and Hexham.

Committee :—

Mr. A. M. Allgood, Walwick Grange, Humshaugh.
Mr. J. L. Heppell, Whorlton House, Westerhope, Newcastle-on-Tyne.
Mr. C. H. Sample, Shildon Grange, Corbridge.
Mr. J. O. Scott, Riding Mill, Northumberland.
Mr. A. C. Spraggon, Willimoteswyke Castle, Bardon Mill.

YORK (NORTH RIDING).

Crathorne (King's Premium).

Owner :—The Lord Middleton, Birdsall, Malton.

Route :—Birdsall, Malton, Hovingham, Gilling, Coxwold, Easingwold, Clifton, Strensall, Sheriff Hutton, and Terrington.

Committee :—

Mr. H. Hawking, Avondale, Easingwold.
Mr. E. Parsons, Estate Office, Birdsall, Malton.
Mr. S. A. Payne-Gallwey, Brandsby Lodge, Easingwold
Mr. J. Wood, East Lilling Grange, Flaxton, York.

Renown (King's Premium).

Owners :—The Compton Stud, Sandley, Gillingham, Dorset.

Route :—Langton Hall, Thirsk, Bedale, Northallerton, Croft Spa, and Scotch Corner.

Committee :—

Mr. J. F. Baker-Baker, East Hall, Middleton Tyas, Yorks.
Mr. T. Clark, Winton House, Northallerton.
Mr. E. H. Courage, The Hall, Kirkby Fleetham, Bedale.

Flying Scot (Board's Permium).

Owner :—Mr. W. Walton, Callais House, Rectory Lane, Guisborough.

Route :—Guisborough, Loftus, Brotton, Saltburn, Redcar, Middlesbrough, Thornaby, Yarm, Stokesley, and Nunthorpe.

Committee :—

Mr. J. Hutchinson, Bank House, Guisborough.
Mr. S. Morton, M.R.C.V.S., Middlesbrough.

Jovial (Board's Premium).

Owner :—The Lord Middleton, Birdsall, Malton.

Route :—Pickering, Salton, Normanby, Nunnington, Helmsley, Kirbymoorside, Snainton, and Seamer.

Committee :—

Mr. A. Pearson, Helmsley, Yorks.
Mr. J. Peters, Duncombe Park Estate Office, Helmsley, Yorks.
Mr. H. P. Webster, Abbey Farm, Yedingham, West Heslerton, Yorks.

Kelso (Board's Premium).

Owners :—Messrs. T. & H. Ward, Pinchinthorpe, Guisborough, Yorks.

Route :—Pinchinthorpe, Hutton, Loftus, Staithes, Lythe, Egton, Castleton, and Little Ayton.

Committee :—

Mr. T. S. Petch, Liverton, Loftus-in-Cleveland.
Mr. G. Rhea, Limber Hill, Glaisdale, Grosmont.
Mr. J. H. Tyerman, Pond Farm, Hinderwell.

DISTRICT CLASS 2.

Cumberland, Lancaster, and Westmorland.
2 King's Premiums.

CUMBERLAND.

Lord Harry (King's Premium).

Owner :—The Earl of Lonsdale, Barley Thorpe, Oakham.

Route :—Lowther, Penrith, Carlisle, Brampton, Aspatria, and Cockermouth.

Committee :—

Mr. G. M. Bell, 1, Lonsdale Street, Carlisle.
Mr. R. E. James, Manor House, Oughterside, Aspatria.
Mr. R. Robinson, Estate Office, Lowther, Penrith.

WESTMORLAND AND LANCASTER.

Tates (King's Premium).

Owner :—Mr. Ralph Rimmer, 52, Stramongate, Kendal.

Route :—Kendal, Windermere, Ulverston, Cartmel, Milnthorpe, Carnforth, and Kirkby Lonsdale.

Committee :—

Mr. A. Hoggarth, Midland Bank Chambers, Kendal.
Dr. E. S. Jackson, Robin Hill, Carnforth.
Mr. W. S. Ridehalgh, Broughton Lodge, Grange-over-Sands.
Mr. G. G. Robinson, Underley Farm, Kirkby Lonsdale.
Mr. J. Towers, Camp House, Hornby, Lancaster.

DISTRICT CLASS 3.

York (East and West Ridings).
7 King's Premiums and 3 Board's Premiums.

YORK (EAST RIDING).

Birk Gill (Super Premium).

Owners :—Capt. T. L. Wickham-Boynton and Mr. H. A. Cholmondeley, Burton Agnes, Driffield.

Route :—Burton Agnes, Swine, Coniston, Preston, Nuthill, Withernwick, Aldbrough, Skirlaugh, Brandesburton, and Beeford.

Committee :—

Mr. F. Reynard, Sunderlandwick, Driffield.
Mr. T. Robinson, Nuthill, Preston, Hull,
Mr. G. Whiting, Estate Office, Burton Agnes, Driffield.

Rathurde (Super Premium and Winner of the King's Champion Challenge Cup).

Owner :—Capt. T. L. Wickham-Boynton, Burton Agnes, Driffield.

Route :—Burton Agnes, Driffield, Bainton, Middleton, Cherry Burton, Bishop Burton, Beverley, Lockington, Cranswick, Frodingham and Kelk.

Committee :—

Mr. F. Reynard, Sunderlandwick, Driffield.
Capt. J. J. Ridley, M.R.C.V.S., Osborne House, Beverley.
Mr. G. Whiting, Estate Office, Burton Agnes, Driffield.

San Stefano (King's Premium).
Owner :—Capt. T. L. Wickham-Boynton, Burton Agnes, Driffield.
Route :—Burton Agnes, Carnaby, North Burton, Hunmanby, Flixton, Ganton, Sherburn, West Hesleton, Weaverthorpe, Langtoft, and Kilham.
Committee :—
Mr. J. S. Chubb, Sledmere, Malton.
Mr. J. Cranswick, The Howe, Hunmanby, Yorks.
Mr. G. Whiting, Estate Office, Burton Agnes, Driffield.

Tantamount (King's Premium).
Owner :—The Lord Middleton, Birdsall, Malton.
Route :—Birdsall, Stamford Bridge, Escrick, Bubwith, Wressle, Howden, North Cave, Newbald, Market Weighton, Pocklington, and Bishop Wilton.
Committee :—
Mr. E. Parsons, Birdsall, Malton.
Mr. C. W. Thompson, Red House, Escrick, York.
Lieut.-Col. The Hon. T. Willoughby, Howsham Hall, York.

YORK (WEST RIDING).

Adeodatus (King's Premium).
Owners :—Messrs. E. & P. Hodgson, Riding Fields Stud, Beverley.
Route :—Selby, Snaith, Goole, Thorne, Doncaster, Monk Fryston, and Haddlesey.
Committee :—
Mr. M. Beaumont, Wood Farm, Whitley Bridge.
Mr. J. S. Johnson, Hook House, Near Goole.
Mr. J. Milner, Norton Priory, Doncaster.

Bachelor's Lodge (Super Premium).
Owners :—Capt. T. L. Wickham-Boynton and Mr. H. A. Cholmondeley, Burton Agnes, Driffield.
Route :—Acomb, Tadcaster, Shadwell, Harewood, Boston Spa, Tockwith, Moor Monkton, and Poppleton.
Committee :—
Mr. C. E. C. Cass, Springwell, Kirk Hammerton, York.
Mr. B. Day, The Rookery, Chapel Allerton, Leeds.
Mr. F. Myers, Grange Farm, Bilbrough, York.

Forcett (King s Premium).
Owner :—Mr. John Lett, Rillington, York.
Route :—Wetherby, Harrogate, Knaresborough, Ripon, Boroughbridge, Otley, and Ripley.
Committee :—
Mr. T. A. Hudson, Rudding House, Pannal, Harrogate.
Mr. B. North, 31, Market Place, Ripon.
Mr. T. Robinson, The Laurels, Wetherby.

Cavour (Board's Premium).
Owners :—Messrs. T. & H. Ward, Pinchinthorpe, Guisborough, Yorks.
Route :—Ilkley, Bradford, Bingley, Shipley, Keighley, Skipton, Gisburn, and Hellifield.
Committee :—
Mr. A. Dewhirst, Park Farm, Eccleshill, Bradford.
Mr. H. Dewhurst, Aireville, Skipton, Yorks.
Mr. J. H. Starkie, Estate Office, Gisburn, Clitheroe.

Ethelbruce (Board's Premium).

Owner :—Mr. T. Carr, Station Road, Selby.

Route :—Sprotborough, Melton, Maltby, Bawtry, Rossington, Wistow Lordship, Cawood, Acaster Selby, Aberford, and South Milford.

Committee :—

Mr. J. Cooke, Melton-on-the-Hill, Doncaster.
Mr. T. Frost, The Poplars, Bawtry, Yorks.
Mr. D. Greenwood, Little Fenton, Leeds.
Mr. J. Wilde, Wistow, Selby, Yorks.

G. P. (Board's Premium).

Owner :—Dr. A. O. Haslewood, Fairfield Stud, Buxton.

Route :—Barnsley, Billingley, Upton, Hampole, Kirk Smeaton, Whitley Bridge, Knottingley, Pontefract, Royston, Clayton West, and Penistone.

Committee :—

Mr. W. Sheard, Clayton West, Huddersfield.
Dr. E. J. H. Sullivan, South Kirkby, Wakefield.
Mr. C. Howard Taylor, Middlewood Hall, Darfield, Barnsley.
Mr. H. S. Tommasson, Plumpton, Penistone.

DISTRICT CLASS 4.

Lincoln (Holland, Kesteven, and Lindsey) and Notts.
3 King's Premiums and 2 Board's Premiums.

LINCOLN (KESTEVEN).

Top Covert (King's Premium).

Owners :—The Exors. of the late F. Hardy, Staunton Hall Stud, Orston, Nottingham.

Route :—Rauceby, Sleaford, Welbourn, Hougham, Manthorpe, Honington, and Folkingham.

Committee :—

Mr. P. Brown, Dorrington, Lincoln.
Mr. C. T. Marriner, Rowston Manor, Lincoln.
Mr. C. Woods, Manthorpe, Grantham.

LINCOLN (LINDSEY).

Last Night (Board's Premium).

Owner :—Mr. C. J. C. Hill, Hemswell, Lincoln.

Route :—Glentworth, Torksey, Lincoln, Brigg, and Wootton.

Committee :—

Mr. F. A. Holmes, M.R.C.V.S., Hemswell, Lincoln.
Mr. W. B. Swallow, Wootton Lawn, Ulceby, Lincs.
Mr. H. C. Tong, Office of the County Council, Mint Street, Lincoln.

Monkey Tricks (Board's Premium).

Owners :—The Southwold Hunt Sire Association, Claythorpe Manor, Alford.

Route :—Alford, Spilsby, Louth, Brocklesby, and Horncastle.

Committee :—

Mr. H. D. Addey, Claythorpe Manor, Alford.
Mr. E. Crowder, Langton Manor, Horncastle.
Mr. B. Rowland, Wainfleet St. Mary, Lincs.

NOTTS.

Indian Runner (King's Premium).

Owner :—Lieut.-Colonel R. L. Birkin, D S.O., Edale House, The Park, Nottingham.

Route :—Radcliffe-on-Trent, Tollerton, Cotgrave, East Bridgford, Southwell, Hockerton, Fledborough, Tuxford, Ollerton, Mansfield, and Nottingham.

Committee :—

Mr. T. Ellerby, Fledborough, Newark.
Mr. H. W. T. Patterson, The Repository, Parliament Street, Nottingham.
Mr. F. O. Thurman, Welldale, East Leake, Loughborough.
Mr. F. B. Wilkinson, Cavendish Lodge, Edwinstowe, Newark.

KESTEVEN AND NOTTS.

Take Care (King's Premium).

Owner :—Mr. R. L. Fenwick, Little Belvoir, Melton Mowbray.

Route :—Bingham, Newark, Grantham, Corby, and Buckminster.

Committee :—

Mr. W. Newton, Barrowby Old Hall, Grantham.
Mr. O. Quibell, Shalem Lodge, Newark.
Mr. J. E. Thurman, Corby Birkholme, Grantham.

DISTRICT CLASS 5.

Derby and Stafford.
2 King's Premiums and 2 Board's Premiums.

DERBY.

Fitz Richard (King's Premium).

Owner :—Dr. A. O. Haslewood, Fairfield Stud, Buxton.

Route :—Buxton, Bakewell, Ashbourne, Uttoxeter, Sudbury, and Derby.

Committee :—

Mr. T. H. L. Duckworth, M.R.C.V.S., Ashbourne.
Messrs. Hampson Bros., 3, The Quadrant, Buxton.
Major F. W. Peacock, Vernons Oak, Somersall Herbert, Derby.

Clear Spring (Board's Premium).

Owner :—Dr. A. O. Haslewood, Fairfield Stud, Buxton.

Route :—Buxton, Foolow, Bamford, Hathersage, Greenhill, Chesterfield, Ashover, Matlock Green, Wirksworth, Youlgreave, and Chelmorton.

Committee :—

Rev. J. B. Nodder, Ashover Rectory, Chesterfield.
Mr. W. Tinsley, Rookery, Ashford, Bakewell.
Mr. W. Wilson, M.F.H., Horsley Gate Hall, Holmesfield, Sheffield.

STAFFORD.

Sysonby (King's Premium).

Owners :—Messrs. J. F. Rees and W. V. Howell Thomas, 22, Lammas Street, Carmarthen.

Route :—Madeley, Newcastle, Stone, Rugeley, Lichfield, Penkridge, Stafford, Eccleshall, and Whitmore.

Committee :—

Mr. R. Carless, M.R.C.V.S., Stafford.
Mr. H. Toon, Greenhill, Norton Bridge, Stone.
Mr. R. S. Wilkinson, Swinchurch, Newcastle, Staffs.
Mr. H. J. C. Winterton, Lichfield.
Mr. E. Woodcock, M.R.C.V.S., Eccleshall, Stafford.

St. Fagans (Board's Premium).

Owners :—Messrs. J. F. Rees and W. V. Howell Thomas, 22, Lammas Street, Carmarthen.

Route :—Alstonfield, Waterhouses, Basford, Cheddleton, Leek, Endon, Hanley, Longton, Cheadle, and Snelston.

Committee :—

Mr. T. Beswick, Alstonfield, Ashbourne.
Dr. Hall, Waterhouses, near Leek.
Mr. P. Hammersley, Derby Street, Leek.

DISTRICT CLASS 6.

Chester, Hereford, and Salop.
3 King's Premiums and 4 Board's Premiums.

CHESTER.

Rays Cross (King's Premium).

Owner :—Mr. L. Cookson, Bryn-y-grog, Wrexham.

Route :—Tarporley, Bunbury, Nantwich, Crewe, Sandbach, Middlewich, Minshull Vernon, Over, Northwich, Chester, and Tarvin.

Committee :—

The Rev. J. H. Armitstead, The Vicarage, Holmes Chapel.
The Rev. Canon J. R. Armitstead, The Vicarage, Sandbach.
Sir Gilbert Greenall, Bart., C.V.O., Walton Hall, Warrington.
Mr. E. C. Griffiths, Broken Cross, Northwich.
Mr. J. W. Macfie, Rowton Hall, Chester.
Mr. G. Norris Midwood, The Grange, North Rode, Congleton.
Mr. C. E. Parton, Haughton Hall Farm, Tarporley.
Mr. B. D. Poole, Marbury Hall, Whitchurch, Salop.

HEREFORD.

Elector (King's Premium).

Owner :—Mr. A. McMahon, Corbally House, Ballylinan, Queen's County, Ireland.

Route :—Hereford, Ledbury, Ross, Leominster, and Bromyard.

Committee :—

Mr. J. Bird, Livers Ocle, Hereford.
Mr. C. Addison Hall, 34, Etnam Street, Leominster.
Capt. T. R. Symons, The Mynde Park, Hereford.

Spey Royal (Board's Premium).
Owner :—Mr. J. B. Dowding, Fairfield, Leominster.
Route :—Fairfield (Leominster), Leintwardine, Titley, Edvin Ralph, and Brimfield.
Committee :—
Mr. H. R. Evans, Court of Noke, Pembridge, Herefordshire.
Mr. C. Addison Hall, 34, Etnam Street, Leominster.
Capt. E. L. Heygate, Buckland, Leominster.

* **The Doctor** (Board's Premium).
Owner :—Mr. J. B. Dowding, Fairfield, Leominster.
Route :—Fairfield (Leominster), Hay, Peterchurch, Blakemere, Tibberton, Madley, and Pyon.
Committee :—
Mr. A. E. Goodwin, Wilmastone, Peterchurch, Hereford.
Mr. Roger Haines, Snodhill, Peterchurch, Hereford.
Mr. C. Addison Hall, 34, Etnam Street, Leominster.

SALOP.

Neyland (King's Premium).
Owner :—Colonel Henry Heywood-Lonsdale, Shavington, Market Drayton.
Route :—Bridgnorth, Much Wenlock, and Corvedale district.
Committee :—
Mr. W. Bishop, Posenhall, Broseley, Salop.
Mr. Blatherwick, Wrixton Manor, Burwarton, Bridgnorth.
Mr. B. Butcher, Eardington, Bridgnorth.
Mr. H. W. Fell, Shavington Grange, Market Drayton.

Jack Scarlett (Board's Premium).
Owner :—Colonel Henry Heywood-Lonsdale, Shavington, Market Drayton.
Route :—Market Drayton, High Ercall, Shrewsbury, Oswestry, Ellesmere, and Whitchurch.
Committee :—
Mr. H. W. Fell, Shavington Grange, Market Drayton.
Mr. R. Hughes, F.R.C.V.S., Oswestry.
Mr. A. Mackenzie, F.R.C.V.S., Market Drayton.
Mr. H. Mason, Kynnersley Manor, Wellington.

Sea Flier (Board's Premium).
Owner :—Major David Davies, M.P., M.F.H., Broneirion, Llandinam, Montgomeryshire.
Route :—Ludlow, Bishop's Castle, Chirbury, Worthen, Pontesbury, Dorrington, Leebotwood, Church Stretton, and Craven Arms.
Committee :—
Mr. C. E. Dayus, M.R.C.V.S., Coton House, Craven Arms, Salop.
Mr. G. Edwards, The Offices, Llandinam, Mont.
Mr. W. Kilvert, New House, Lydbury North, Salop.
Mr. C. Price, Leigh Hall, Minsterley, Salop.
Mr. T. Whitfield, 12, Talbot Chambers, Shrewsbury.
Mr. H. E. Whittaker, M.F.H., Ludford Park, Ludlow.

* Hunter Stallion.

DISTRICT CLASS 7.

Counties of Wales.
5 King's Premiums and 3 Board's Premiums.

ANGLESEY.

Sanglamere (King's Premium).

Owners :—Messrs. J. F. Rees, and W. V. Howell Thomas, 22, Lammas Street, Carmarthen.

Route :—Tynygongl, Rhosgoch, Llanerchymedd, Llangefni, Bodorgan, Ty Croes, Valley, Llanfair, and Beaumaris.

Committee :—

Mr. J. Coulthard, Baron Hill Home Farm, Beaumaris.
Mr. W. H. Jones, Fferam Rhosydd, Bodorgan.
Mr. W. H. Owen, Fferam Paradwys, Bodorgan.
Mr. O. Trevor Williams, Llangefni.

CARMARTHEN.

Scipio (King's Premium).

Owners :—Messrs. J. F. Rees and W. V. Howell Thomas, 22, Lammas Street, Carmarthen.

Route :—Carmarthen, Nantcaredig, Llanarthney, St. Clears, Whitland, Llanboidy, and Mydrim.

Committee :—

Mr. E. Jones, Manoravon, Llandilo, Carmarthenshire.
Mr. D. H. Thomas, Starling Park, Carmarthen.

GLAMORGAN.

Jingling Geordie (King's Premium).

Owner :—Mr. J. Staien, Coed Hills Stud Farm, St. Hilary, Cowbridge.

Route :—Cowbridge, Llantwit Major, Rhoose, St. Fagans, Tongwynlais, Caerphilly, Abercynon, Pontypridd, Llantrissant, Wick, Bridgend, and Pencoed.

Committee :—

Mr. E. T. Lloyd, Llantwit Major, Cardiff.
Mr. I. Williams, Castleton, St. Athan, Cardiff.
Mr. R. H. Williams, M.F.H., The Ham, Llantwit Major, Cardiff.

MONMOUTH.

* **Alha II.** (Board's Premium).

Owner :—Mr. A. M. Pilliner, Llanyravon, Near Newport, Mon.

Route :—Llanyravon, Pontypool, Goytre, Abergavenny, Penpergwm, Usk, Chepstow, Caerwent, Magor, Llanwern, and Caerleon.

Committee :—

Mr. A. G. Burchardt-Ashton, Llandogo Priory, Chepstow.
Mr. C. B. Knight, Llanvihangel Court Farm, Roggiett, Newport, Mon.
Mr. A. M. Pilliner, Llanyravon, Newport, Mon.

* Hunter Stallion.

• MONTGOMERY.

Great Surprise (Super Premium).

Owner :—Major David Davies, M.P., M.F.H., "Broneirion," Llandinam, Montgomery.

Route :—Llandinam, Newtown, Sarn, Montgomery, Forden, Welshpool, Pool Quay, Llanymynech, Garthmyl, and Abermule.

Committee :—

Mr. T. Green, The Bank, Pool Quay, Welshpool.
Capt. C. M. S. Humphreys, Garthmyl Hall, Garthmyl, Mont.
Mr. E. C. Morgan, Crown Chambers, Newtown.
Mr. R. Morgan, Snowfield, Kerry, Newtown.

* **Ballinasloe** (Board's Premium).

Owner :—Major David Davies, M.P., M.F.H., "Broneirion," Llandinam, Montgomery.

Route :—Manafon, Llanfair, Meifod, Llanfyllin, Llangedwyn, Llansantffraid, Guilsfield, Buttington, Churchstoke, and Berriew.

Committee :—

Mr. T. Green, The Bank, Pool Quay, Welshpool.
Capt. C. M. S. Humphreys, Garthmyl Hall, Garthmyl, Mont.
Mr. E. C. Morgan, Crown Chambers, Newtown.
Mr. R. Morgan, Snowfield, Kerry, Newtown.

PEMBROKE.

Just Cause (King's Premium).

Owner :—Mr. J. Griffiths, Jameston Court, Manorbier, Pembs.

Route :—Haverfordwest, South Row, Pembroke, Cresselly, Templeton, and Narberth.

Committee :—

Mr. J. Gibbon, Vaynor, Narberth, Pembs.
Mr. G. D. Llewellyn, Stephens Green, Milton, Pembroke.
Mr. T. G. Phelps, Cresselly, Begelly, Pembs.

Barbed Fence (Board's Premium).

Owner :—Mr. J. Griffiths, Jameston Court, Manorbier, Pembs.

Route :—Narberth, Clynderwen, Boncath, Clynfiew, Newport, Fishguard, Letterston, St. Davids, Camrose, and Haverfordwest.

Committee :—

Mr. G. B. Bowen, Llwyngwair, Newport, Pembs.
Mr. V. J. G. Johns, Fishguard.
Mr. T. E. Lewis-Bowen, Clynfiew, Boncath, Pembs.

DISTRICT CLASS 8.

Gloucester, Oxford, Warwick, and Worcester.
6 King's Premiums and 4 Board's Premiums.

GLOUCESTER.

Gilgandra (Super Premium).

Owners :—The Compton Stud, Sandley, Gillingham, Dorset.

Route :—Cirencester, Fairford, Burford, Kingham, Lower Slaughter, and Northleach.

Committee :—

Mr. P. Barnett, 4, Bromley Terrace, Cirencester.
Mr. E. T. Prichard, Donnington Manor, Moreton-in-Marsh, Glos.
Mr. A. Rixon, Turkdean Manor, Northleach, Glos.

* **Hunter Stallion.**

John Lambton (Super Premium).
Owners :—The Compton Stud, Sandley, Gillingham, Dorset.
Route :—Berkeley Road, Stroud, Tetbury, and Yate.
Committee :—
Mr. J. Pearce Ellis, Maisemore Court, Gloucester.
Colonel F. Henry, Elmstree, Tetbury, Glos.
Mr. A. Miller, Badminton, Glos.

Sandow (Board's Premium).
Owners :—The Compton Stud, Sandley, Gillingham, Dorset.
Route :—Gloucester, Newent, Tewkesbury, Winchcombe, and Cheltenham.
Committee :—
Mr. Granville Acworth, The Hill Ash, Dymock, Glos.
Mr. H. Dent-Brocklehurst, Sudeley Castle, Winchcombe, Glos.
Mr. J. Gibbons, Boddington Manor, Cheltenham.

OXFORD.

Toyshop (Board's Premium).
Owner :—Mr. J. Mumford, Stud Farm, Knightcote, Leamington Spa.
Route :—Oxford, Woodstock, Bicester, Witney, Charlbury, and Heyford.
Committee :—
Mr. R. K. McPherson, Randolph Hotel Stables, Oxford.
Mr. G. Mansfield, Spring Hill House, Hethe, Bicester.
Mr. B. W. Millington, Deddington, Oxford.

WARWICK.

Newmarket (King's Premium).
Owner :—Lord Willoughby de Broke, Compton Verney, Warwickshire.
Route :—Kineton, Wellesbourne, Hampton Lucy, Stratford-on-Avon, Oxhill, Fenny Compton, and Radway.
Committee :—
Lord Willoughby de Broke, Compton Verney, Warwickshire.
Mr. C. Kendal, Mount Pleasant, Walton, Warwick.
Mr. J. Lea, Charlecote, Warwick.
Mr. J. Wilkes, Tredington, Shipston-on-Stour.

Soft Answer (King's Premium).
Owner :—Mr. S. Mumford, Stud Farm, Moreton Morrell, Warwick.
Route :—Southam, Shuckburgh, Dunchurch, Rugby, Pailton, Brinklow, Brandon, Offchurch, and Ufton.
Committee :—
Mr. J. Ashburner, Brandon, near Coventry.
Mr. J. B. Johnson, Manor House, Willoughby, Rugby.
The Hon. C. Portman, Goldicote, Statford-on-Avon.
Mr. E. Ringer, M.R.C.V.S., Guy Street, Leamington Spa.

The Tailor (King's Premium).
Owner :—Mr. S. Mumford, Stud Farm, Moreton Morrell, Warwick.
Route :—Nuneaton, Coleshill, Stonebridge, Knowle, Hockley Heath, Beoley Cross, Henley-in-Arden, Kenilworth, and Warwick.
Committee :—
Mr. J. P. Arkwright, Hatton House, Warwick.
Mr. T. M. Burman, Bragg's Farm, Shirley, near Birmingham.

WORCESTER.

Puro Caster (King's Premium).

Owner :—Lord Willoughby de Broke, Compton Verney, Warwickshire.

Route :—Worcester, Droitwich, Bromsgrove, and Redditch.

Committee :—

Major J. Baldwin, Alvechurch, Birmingham.
Mr. R. Cottrill, Sandal Lodge, Droitwich.
Mr. A. Jones, Ombersley, Droitwich.
Colonel W. Stallard, Worcester Chambers, Pierpoint Street, Worcester.

Comic Charlie (Board's Premium).

Owner :—Mr. T. J. Hillman, Stud Farm, Stock Wood, Redditch, Worcestershire.

Route :—Inkberrow, Wesham, Pershore, Birlingham, Kempsey, Spetchley, and Upton Snodsbury.

Committee :—

Colonel A. H. Hudson, Wick House, Pershore, Worcester.
Mr. G. Dudley Smith, Strensham Court, Worcester.
Mr. Ernest Tipping, Inkberrow, Worcester.

Jeremiah (Board's Premium).

Owner :—Mr. W. P. Pope, Brockamin, Leigh, Worcester.

Route :—Leigh, Knightwick, Suckley, Malvern, Hanley Castle, Upton-on-Severn, Madresfield, Powick, and district.

Committee :—

Mr. W. J. Gusson, M.F.H., Severn Stoke, Worcester.
Mr. G. Dudley Smith, Strensham Court, Worcester.
Mr. T. Lawson Walker, Knightwick Manor, Worcester.

DISTRICT CLASS 9.

Bedford, Hunts, Leicester, Northampton, Rutland, and Soke of Peterborough.

5 King's Premiums and 3 Board's Premiums.

BEDFORD.

Sundawn (King's Premium).

Owner :—Mr. D. Fraser, Tickford Park, Newport Pagnell.

Route :—Moulsoe, Cranfield, Kempston, Bromham, Harrold, Thurleigh, Great Barford, Biggleswade, Broom, Shefford, Sharpenhoe, and Woburn.

Committee :—

Mr. G. E. Brown, Marston Moretaine, Ampthill.
Mr. B. Howkins, Bromham, Bedford.
Mr. H. King, Broom, Biggleswade.
Mr. J. C. H. Robinson, Marsh Leys, Kempston, Bedford.
Mr. S. Seymour, "The Lodge," Ampthill.

HUNTS.

Bachelor's Charm (Super Premium).

Owner :—Major David Davies, M.P., M.F.H., "Broneirion," Llandinam, Mont.

Route :—Huntingdon, St. Ives, Somersham, Pidley, Ramsey, Alconbury, St. Neots, Staughton, and Ellington.

Committee :—

Mr. A. G. Dilley, Market Hill, Huntingdon.
Mr. E. J. Francis, Alconbury House Farm, Huntingdon.
Mr. F. Goodliff, Montagu House, Huntingdon.
Mr. A. Jordan, Wistaria House, St. Neots.
Mr. J. P. Pentelow, Tollington House, Somersham St. Ives, Hunts.

LEICESTER.

Tidal Wave (Super Premium).

Owner :—Mr. R. L. Fenwick, Little Belvoir, Melton Mowbray.

Route :—Melton Mowbray, Waltham, Six Hills, Loughborough, and Brooksby.

Committee :—

Mr. H. Black, Frisby-on-the-Wreake, Leicester.
Mr. J. E. Tidmas, Normanton-on-Soar, Loughborough.
Mr. D. Ward, Bescaby, Melton Mowbray.

Golden Song (Board's Premium).

Owner :—Mr. H. T. Hincks, Wigston Hall, Leicester.

Route :—Wigston, Cosby, Kirkby Mallory, Market Bosworth, Osbaston, Nailstone, Anstey, Woodhouse Eaves, Quorn, Wanlip, Leicester, and Burton Overy.

Committee :—

Mr. S. Nevins Bankart, Hazeldene, London Road, Leicester.
Mr. R. Bingley, Smeeton Westerby, Leicester.
Mr. J. Nelson, Kirkby Mallory, Hinckley.
Mr. G. M. Pettifor, Anstey, Leicester.

NORTHAMPTON.

Chanteur (Super Premium).

Owner :—Mr. J. Drage, Chapel Brampton, Northampton.

Route :—Chapel Brampton, West Haddon, Crick, Daventry, Woodford, Towcester, and Northampton.

Committee :—

Mr. W. D. Grant Ives, Braddon, Towcester.
Mr. J. G. Lawrence, High Street, Daventry.
Mr. E. Messinger, Chapel Brampton, Northampton.
Mr. W. Murland, Badby House, Daventry.

Ulpian (King's Premium).

Owner :—Mr. D. Fraser, Tickford Park, Newport Pagnell, Bucks.

Route :—Wansford, Rockingham, Kettering, Wellingborough, Thrapston, and Oundle.

Committee :—

Mr. W. Cheney, Barnwell, Oundle.
Mr. H. Czarnikow, Barnwell Castle, Oundle.
Mr. F. Percival, Thornhaugh, Wansford.
Mr. J. Singlehurst, Weldon, Kettering.

Snap Dragon (Board's Premium).

Owner :—Mr. J. Drage, Chapel Brampton, Northampton.

Route :—Chapel Brampton, Market Harborough, Cranoe, Kilworth, Brixworth, and Denton.

Committee :—

Mr. J. Brown, Earl's Barton House, Northampton.
Mr. E. Messinger, Chapel Brampton, Northampton
Mr. H. R. Roe, Cranoe, Market Harborough.

RUTLAND.

Cyclops Too (Board's Premium).

Owner :—Mr. G. E. Gibson, M.R.C.V.S., Oakham.

Route :—Oakham, Braunston, Loddington, Hallaton, Thorpe-by-Water, Glaston, Luffenham, Wymondham, Stapleford, and Whissendine.

Committee :—

Mr. A. R. Barnett, Thistleton, Oakham.
Mr. G. E. Gibson, M.R.C.V.S., Oakham.
Mr. J. Northen, Thorpe-by-Water, Uppingham.

DISTRICT CLASS 10.

Cambridge, Isle of Ely, Norfolk, and Suffolk.
3 King's Premiums and 4 Board's Premiums.

NORFOLK.

Merry Fox (King's Premium).

Owner :—Capt. A. E. Clerk, c/o The Manager, Burton Agnes Stud, Driffield, Yorks.

Route :—King's Lynn, Stow, Narborough, Massingham, Stanhoe, and Hunstanton.

Committee :—

Mr. A. E. Birch, Watlington Hall, Downham Market.
Mr. G. Brereton, Flitcham Hall, King's Lynn.
Mr. J. Dennick, Valinger House, King's Lynn.
Mr. W. Goodwyn, East Winch, King's Lynn.
Mr. D. S. Jack, M.R.C.V.S., King's Lynn.

Sea Bath (King's Premium).

Owners :—The Exors. of the late R. W. Palmer, Swafield House Stud Farm, North Walsham, Norfolk.

Route :—North Walsham, Acle, Loddon, Harleston, Wymondham, and Norwich.

Committee :—

The Rev. A. Fellowes, Shotesham Vicarage, Norwich.
Mr. E. D. Horsefield, Antringham, North Walsham, Norfolk.
Mr. T. O. Springfield, Aldburgh House, Harleston.

* **Gateboy** (Board's Premium).

Owners :—The Association of Farmers in Norfolk, *per* Mr. H. Overman, Kipton House, Weasenham St. Peter, Swaffham.

Route :—Dunston Hall, Swaffham Pickenham, Cley, Westacre, Rougham, Lexham, Litcham, Raynham, Weasenham St. Peter East Rudham, Burnham, Creake, Fakenham, Aylsham, and East Dereham.

Committee :—

Colonel G. F. Buxton, Dunston Hall, Norwich.
Major A. Collison, Weylands, Cromer.
Mr. F. D. Ives, The Grange, Erpingham, Norwich.
Mr. H. Overman, Kipton House, Weasenham St. Peter, Swaffham.

† **Misanthrope** (Board's Premium).

Owner :—Mr. H. Overman, Kipton House, Weasenham St. Peter, Swaffham.

Route :—Weasenham and District.

No Committee.

SUFFOLK.

General Stössel (King's Premium).

Owner :—Mr. S. Mumford, Stud Farm, Moreton Morrell, Warwick.

Route :—Ipswich, Hadleigh, Saxmundham, Woodbridge, Manningtree District, Stowmarket, and Needham Market.

Committee :—

Mr. J. G. Howells, St. Edmunds Road, Ipswich.
Mr. J. R. Keeble, Brantham Hall, Manningtree.
Mr. A. Phillips, 14, Museum Street, Ipswich.

Chance Bird (Board's Premium).

Owner :—Mr. T. Davidson, 18, Percy Gardens, Tynemouth, North Shields, Co. Durham.

Route :—Nowton, Horringer, Haverhill, Thurlow, Long Melford, Lawshall, Bury St. Edmunds, and Fornham.

Committee :—

Mr. S. R. Jaggard, Ixworth, Bury St. Edmunds.
The Rev. Sir W. Hyde Parker, Bart., Melford Hall, Long Melford.
Mr. H. Westrop, Long Melford.

Popoffka (Board's Premium).

Owner :—Mr. P. Palmer, Thornham, Eye, Suffolk.

Route :—Thornham, Eye, Debenham, Stradbroke, Halesworth, Schole, and Diss.

Committee :—

Mr. T. Lang, Thornham Parva, Eye, Suffolk.
Mr. R. Nestling, White House, Earl Soham, Framlingham, Suffolk.
Mr. J. Staff, Bergate Hall, Diss.

* Hunter Stallion. † Percheron Stallion.

DISTRICT CLASS 11.

Bucks, Essex, Herts, and Middlesex.
3 King's Premiums and 1 Board's Premium.

BUCKS.

Blue Stone (King's Premium).

Owner :—Mr. D. Fraser, Tickford Park, Newport Pagnell, Bucks.

Route :—Newport Pagnell, Cosgrove, Hanslope, Stony Stratford, Buckingham, and Fenny Stratford.

Committee :—
Mr. F. W. Coales, Lathbury, Newport Pagnell.
Mr. M. Grimes, Tickford Park Stud, Newport Pagnell.
Mr. C. D. Pennant, Lillingstone Dayrell, Buckingham.

ESSEX.

Captain Jack (King's Premium).

Owner :—Mr. A. S. Bowlby, Gilston Park, Harlow, Essex.

Route :—Harlow, Bishop's Stortford, Dunmow, Braintree, Witham, Chelmsford, and Ongar.

Committee :—
Mr. T. Christy, Roxwell, Chelmsford.
Mr. J. Hughes, Gilston Park, Harlow.
Mr. A. J. Waters, Coopersale Lodge, Epping.
Mr. J. Bishop Young, F.R.C.V.S., Braintree.

Kano (King's Premium).

Owner :—The Hon. Mrs. Ives, Moyns Park, Birdbrook, Halstead.

Route :—Birdbrook District, Halstead, Saffron Walden, Braintree, Sudbury, and Colchester.

Committee :—
Mr. T. W. Goodchild, Great Yeldham, Halstead.
Mr. R. D. Hill, Holfield Grange, Coggeshall.
Mr. W. Price, Rylands, Steeple Bumpstead.
Mr. J. Bishop Young, F.R.C.V.S., Braintree.

HERTS.

Sammarco (Board's Premium).

Owner :—Mr. H. Arnold, Crews Hill Paddocks, Enfield, Middlesex.

Route :—Barnet, Elstree, St. Albans, Harpenden, Hatfield, Hertford, and Hoddesdon.

Committee :—
Mr. J. Bell, Cattlegate, Enfield.
Capt. W. P. Jeffcock, West Common, Harpenden.
Mr. J. C. McCowan, Hatfield.
Mr. S. H. Wall, Homestead Stud Farm, Galley Lane, Barnet.

DISTRICT CLASS 12.

Kent, Surrey, and Sussex (East and West).
4 King's Premiums and 2 Board's Premiums

KENT.

Stortford (King's Premium).

Owner :—Capt. H. Faudel Phillips, Mapleton Stud, Eden Bridge, Kent.

Route :—Eden Bridge, Tonbridge, Paddock Wood, Maidstone, Kemsing, and Sevenoaks.

Committee :—

Mr. M. R. Aird, 3, Hyde Park Square, London, W. 2.
Mr. G. Arnold, Hall Place, East Peckham, Paddock Wood.
Mr. W. M. Brydone, The Kennels, Otford, Sevenoaks.
Mr. T. P. Hirons, Linton Park, Maidstone.

Chalk Stream (Board's Premium).

Owner :—Mr. S. Mumford, Stud Farm, Moreton Morrell, Warwick.

Route :—Headcorn, Newnham, Hernhill, Bishopsbourne, Lyminge, Ashford, and Great Chart.

Committee :—

Mr. A. J. Burrows, Ashford, Kent.
Mr. T. P. Hirons, Linton Park, Maidstone.
Mr. W. L. Hubble, The Orchard, Hernhill, Faversham.
Mr. H. W. Selby Lowndes, Handley Cross, Lyminge, Folkestone.

SURREY AND SUSSEX (EAST).

Rockaway (King's Premium).

Owner :—Mr. C. Kelway-Bamber, Priestlands Stud, Martyrs, Crawley, Sussex.

Route :—Burgess Hill, Uckfield, East Grinstead, Holmwood, Dorking, Epsom, and Reigate.

Committee :—

Mr. C. H. Howard, M.R.C.V.S., 41, High Street, Dorking.
Mr. Watkin James, Fir Grove, Burgess Hill, Sussex.
Mr. H. F. Sturdy, M.F.H., Felcourt, East Grinstead.

SUSSEX (EAST).

Eton Boy (King's Premium).

Owner :—Mr. H. P. Nickalls, The Kennels, Horley, Surrey.

Route :—Catsfield, Ninfield, Hailsham, Polegate, Firle, Ringmer, Blackboys, Mayfield, Wadhurst, Ticehurst, Hurst Green, and Battle.

Committee :—

Mr. J. E. Muggeridge, New Place, Framfield, Uckfield.
Mr. H. T. Simmons, Wychnour, Battle, Sussex.
Mr. T. Kirby Stapley, M.F.H., The Kennels, Catsfield, Battle.

SUSSEX (WEST).

Cock-a-Hoop (Super Premium).

Owner :—Major Sir Merrik R. Burrell, Bart., Knepp Castle, Horsham.

Route :—Arundel, Lavant, Petworth, Knepp Castle, West Grinstead district, Ashington district, Steyning, and Pulborough.

Committee :—

Mr. E. Brown, Knepp Castle Stud Farm, West Grinstead.
Mr. F. H. Sawtell, Langford, Chichester.
Mr. C. H. Spurgeon, High Street, Petworth.
Mr. J. B. Watson, Estate Office, Petworth.

SURREY AND SUSSEX (WEST).

* **The Best** (Board's Premium).

Owner :—Major Sir Merrik R. Burrell, Bart., Knepp Castle, Horsham.

Route :—Slinfold, Plaistow, Midhurst, Petworth, Knepp, Shipley district, Guildford, Godalming, and Haslemere.

Committee :—

Mr. E. Brown, Knepp Castle Stud Farm, West Grinstead.
Mr. C. H. Spurgeon, High Street, Petworth.
Mr. J. B. Watson, Estate Office, Petworth.

DISTRICT CLASS 13.

Berks, Hants, and Isle of Wight.
3 King's Premiums and 3 Board's Premiums.

BERKS.

Persimmon's Pride (King's Premium).

Owner :—Mr. S. Mumford, Stud Farm, Moreton Morrell, Warwick.

Route :—Twyford, Maidenhead, Windsor, Ascot, Bracknell, Wokingham, Strathfieldsaye, Hartley Row, Odiham, and Yateley.

Committee :—

Mr. C. Aldin, The Kennels, Purley, near Reading.
Mr. R. H. Gosling, The Kennels, Bracknell.
Mr. St. G. Littledale, Wick Hill House, Bracknell.
Mr. G. P. Male, Friar Street, Reading.
Sir G. Mildmay, Bart., Dogmersfield Park, Winchfield, Hants.
Mr. E. M. Sturges, Barkham Square, Wokingham.

Political (King's Premium).

Owners :—The Compton Stud, Sandley, Gillingham, Dorset.

Route :—Buscot, Shrivenham, Kingston Lisle, Garford, and Shippon (Abingdon).

Committee :—

Mr. L. A. Barrett, Milton, Steventon, Berks.
Mr. W. Crosland, Estate Office, Buscot Park, Faringdon, Berks.
Mr. E. Robson, Stockham, Wantage, Berks.

* Hunter Stallion.

HANTS.

Egret (King's Premium).

Owner :—Mr. J. E. A. Willis-Fleming, Stoneham Park, Eastleigh, Hants.

Route :—Petersfield, Havant, Fareham, Wickham, West Meon, Hawkley, and Liss.

Committee :—

Mr. R. Austin, Bishop's Waltham, Hants.
Admiral Baily, Hinton House, Horndean.
Mr. S. Hardy, The Spain, Petersfield.
Capt. P. W Seward, Weston, Petersfield

Be the Hush (Board's Premium).

Owner :—Mr. J. E. A. Willis-Fleming, Stoneham Park, Eastleigh, Hants.

Route :—Romsey, Whiteparish, Salisbury, Grateley, Andover, and Stockbridge.

Committee :—

Capt. G. Eyre Matcham, Newhouse, Redlynch, Salisbury.
Mr. H. Martin Powell, Wilverley Park, Lyndhurst.
Mr. E. E. Ralls, 19, Market Place, Romsey.
Mr. G. Thursby, Fountain Court, Brook, Lyndhurst.
Mr. J. E. A. Willis-Fleming, Stoneham Park, Eastleigh, Hants.

Thorndyke (Board's Premium).

Owner :—Mr. H. Arnold, Crews Hill Paddocks, Enfield, Middlesex.

Route :—Bishop's Waltham, Tichborne, Alton, Basingstoke, Whitchurch, and Hursley Park.

Committee :—

Mr. R. Austin, Bishop's Waltham, Hants.
Mr. J. F. Complin, Holybourne, Alton.
Mr. F. Coryton, The Manor House, Greatham, Liss, Hants.
Mr. T. A. Edney-Hayter, The Mount, Whitchurch, Hants.
Sir Richard Rycroft, Bart., Dummer House, Basingstoke.

ISLE OF WIGHT.

Square Root (Board's Premium).

Owner :—Dr. W. J. Jolliffe, Yafford House, Shorwell, Newport, Isle of Wight.

Route :—Shorwell, Sandown, Ryde, Yafford, and Freshwater.

Committee :—

Mr. J. Attrill, Waytescourt, Brighstone, Newport, Isle of Wight.
Capt. H. Collingwood Bertram, West Standen, Newport, Isle of Wight.
Major-Gen. Fetherstonhaugh, Gwydyr House, Ryde, Isle of Wight.

DISTRICT CLASS 14.

Dorset, Somerset, and Wilts.
6 King's Premiums and 2 Board's Premiums.

DORSET.

Red King (King's Premium).

Owners :—The Compton Stud, Sandley, Gillingham, Dorset.
Route :—Bagber, Ansty, Bere Regis, Sturminster Marshall, and Blandford.
Committee :—
Mr. T. Bartlett, Screech Hill, St. Giles, Cranborne, Salisbury.
Mr. R. Cave, Alner, Blandford.
Mr. W. C. Martin, Moor Court, Wimborne.

Thistledown (Board's Premium).

Owners :—The Compton Stud, Sandley, Gillingham, Dorset.
Route :—Dorchester, Maiden Newton, Beaminster, Leigh, Cerne Abbas, and Puddletown
Committee :—
Colonel H. Alexander, D.S.O., The Grange, Chetnole, Dorset.
Colonel Brough, 56, High West Street, Dorchester.
Mr. F. Pope, Great Toller, Dorchester.

SOMERSET.

Gay Lally (Super Premium).

Owners :—The Compton Stud, Sandley, Gillingham, Dorset.
Route :—Shepton Mallet, Wells, Bruton, and Frome.
Committee :—
Mr. G. Adlam, Wookey Hole, Wells.
Mr. L. B. Beauchamp, Norton Hall, near Bath.
Mr. A. C. Clarke, Red Lion Hotel, Shepton Mallett.
Mr. H. T. B. Saunders, Woodside, Sparkford, Bath.

King Edgar (King's Premium).

Owner :—Mr. B. M. Slocock, Hanover House, Carlow, Ireland.
Route :—Keynsham, Long Ashton, Portishead, Clevedon, Yatton, Congresbury, Worle, Banwell, Blagdon, and Harptree.
Committee :—
Mr. R. A. Bowring, Rockhill, Keynsham, Bristol.
Mr. E. A. Hardwick, Seaton, Tavistock, Devon.
Mr. T. H. Pearce, Long Ashton, Bristol.

King of the Wavelets (King's Premium).

Owner :—Mr. S. Mumford, Stud Farm, Moreton Morrell, Warwick.
Route :—Dulverton, Wiveliscombe, Williton, and Minehead.
Committee :—
Mr. H. H. Sweet Escott, Bicknoller, Taunton.
Mr. C. L. Hancock, Cothelstone Manor, Taunton.
Mr. D. J. Tapp, Higher Combe, Dulverton.

Lorello (Board's Premium).

Owner :—Mr. A. G. Parsons, Kilmington Stud, Axminster, Devon.

Route :—Yeovil, Kingsdon, Curry Rivel, Taunton, Chard, Crewkerne, and Wellington.

Committee :—

Capt. G. Phipps Hornby, Somerton Erleigh, Somerset.
Mr. J. F. Neal, Kingsdon, Taunton.
Mr. J. White, Gate House, Taunton.

WILTS.

Garborian (King's Premium).

Owners :—The Compton Stud, Sandley, Gillingham, Dorset.

Route :—Chippenham, Melksham, Westbury, Devizes, and Calne.

Committee :—

Mr. F. Doble, Berwick Bassett, Swindon, Wilts.
Mr. C. Garnett, Great House, Kington Langley, Chippenham, Wilts.
Mr. W. Preston, M.F.H., Seend, Melksham, Wilts.

Wilful Willie (King's Premium).

Owners :—The Compton Stud, Sandley, Gillingham, Dorset.

Route :—Swindon, Wootton Bassett, Malmesbury, Cricklade, and Highworth.

Committee :—

Mr. H. Baker, Chedglow Manor, Crudwell, Malmesbury.
Mr. G. Buxton, Tottenham Manor, Wootton Bassett.
Mr. H. C. Sutton, Holdcroft, Blunsdon, Highworth, Swindon.

DISTRICT CLASS 15.

Cornwall and Devon.
3 King's Premiums and 3 Board's Premiums.

CORNWALL.

Marzio (King's Premium).

Owner :—Mr. M. J. Taylor, Ermington, Ivybridge, Devon.

Route :—Liskeard, Callington, Launceston, Camelford, Wadebridge, Bodmin, Lostwithiel, Duloe, and Looe.

Committee :—

Mr C Burleigh, Sportsman's Arms, Menheniot Station, Liskeard.
Mr. H. G. P. Hoblyn, Colquite, Washaway, Cornwall.
Mr. Brooking Trant, Trethawle, Liskeard.
Mr. T. Yeo, St. Leonards, Bodmin.

Adular (Board's Premium).

Owners :—Board of Agriculture and Fisheries, Whitehall Place, London, S.W. 1.

Route :—Truro, St. Columb, St. Austell, Penzance, Helston, and Redruth.

Committee :—Mr. Coulter Hancock, 12, Princes Street, Truro.
Mr. H. Montagu Rogers, Nansloe, Helston.
Major J. Williams, Scorrier House, Scorrier, Cornwall.

DEVON.

Golden Grebe (King's Premium).

Owners :—Messrs. W. & H. Whitley, Primley Farm, Paignton.
Route :—Paignton, Totnes, South Brent, Plympton, Yealmpton, Kingsbridge, Newton Abbot, Exeter, and Dawlish.
Committee :—
Mr. M. Ball, Newton Abbot.
Mr. P. G. Bond, M.R.C.V.S., 105, Union Street, Plymouth.
Mr. C. Harris Pitts, South Allington, Kingsbridge.

Wuffy (King's Premium).

Owner :—Mr. A. G. Parsons, Kilmington Stud, Axminster, Devon.
Route :—Axminster, Honiton, Seaton, and Sidmouth Junction.
Committee :—
Mr. R. J. Broom, Boro' House, Axmouth, Axminster.
Mr. C. Foward, Solicitor, Axminster.
Mr. H. W. Gould, 2, Bedford Circus, Exeter.
Mr. G. D. Lansley, M.R.C.V.S., Axminster.

Bridge of Orchy (Board's Premium).

Owners :—The Bingham Lodge Stud, Chard.
Route :—Okehampton, Tavistock, Holsworthy, Tiverton, Crediton, and Cullompton.
Committee :—
Mr. J. Farrant, Tiverton.
Major L. C. Garratt, Mill Down, Clyst St. Mary, Exeter.
Mr. A. C. Godfrey, Tavy Cottage, Tavistock.
Mr. E. P. Northey, Higher Bowden, Okehampton.

Monkey Brand (Board's Premium).

Owner :—Mr. A. G. Parsons, Kilmington Stud, Axminster, Devon.
Route :—Barnstaple, South Molton, Torrington, and Bideford.
Committee :—
Mr. W. Harris, Bountisthorn, West Putford, Devon.
Mr. T. W. Smith, East Down, Barnstaple.
Mr. H. Turner, The Barton, Instow, North Devon.

All the Stallions are thoroughbred except where otherwise indicated.

THE following Note has been communicated to the Board by A. W. Oldershaw, B.Sc., Agricultural Organiser for East Suffolk, and Honorary Secretary of East Suffolk War Agricultural Committee:—

East Suffolk Scheme for the Distribution of Sulphate of Ammonia.

Immediately it was constituted (at the end of January, 1917), the Executive Committee of East Suffolk War Agricultural Committee gave careful consideration to the question of supplies of artificial manures. In view of the lateness of the time at which executive powers were granted to the Committee, the members came to the conclusion that they were more likely to increase agricultural production in 1917 by stimulating the use of artificial manures than by any other activity which might engage their attention.

There was therefore called a preliminary conference, which the manure manufacturers and merchants in the county were invited to attend, and the whole question of chemical manures was discussed.

It was ascertained that practically all the phosphatic manures available for this season were already sold. The Committee therefore decided that it was useless to take any action with reference to these manures. Inquiry elicited the fact that considerable supplies of sulphate of ammonia were available. Most of this, however, was in store in manufacturing centres in the north and midlands of England at a considerable distance from East Suffolk, and the local merchants were not prepared to buy and store any considerable quantity of this on the chance of its being purchased by East Suffolk farmers.

After careful consideration the Committee decided that the best course to pursue would be for them to purchase a preliminary 200 tons from local firms and re-sell it to farmers. This course was adopted with the approval of the Board of Agriculture. All members of the District War Agricultural Committees were asked to canvass the parishes which they represented, and to obtain orders for sulphate of ammonia. It may be mentioned that on an average each member of a District War Agricultural Committee in the county represents two parishes, so that the work placed on any individual member did not prove very onerous.

At the commencement of February, when the canvass was undertaken, most of those farmers who are in the habit of using chemical manures had already made their purchases, the Committee having appealed to farmers, by means of posters and a circular letter sent out to every farmer in the county in November, 1916, to use an increased quantity of chemical fertilisers and to purchase early.

As a result, however, of the personal canvass made by the members of the District Committees, orders were obtained for no less than 694 tons 16 cwt. of sulphate of ammonia.

The success of the scheme must be attributed in great part to the enthusiasm with which the members of the District Committees canvassed their neighbours.

It may be mentioned that with each invoice, a short leaflet written by the County Agricultural Organiser was enclosed. This leaflet gave detailed instructions in as clear a manner as possible as to the use of the manure and the crops to which it should be applied.

It may be estimated that with ordinary good fortune, and if used judiciously, 1 cwt. of sulphate of ammonia is likely to produce 2½ cwt. of grain. On this basis the increased quantity of grain obtained in the county as a result of the action taken by the Committee may be placed roughly at 1,700 tons.

OFFICIAL NOTICES AND CIRCULARS.

LIVE STOCK—CEREAL FOODS—PRICES—CULTIVATION—LABOUR—MISCELLANEOUS.

LIVE STOCK.

THE following Leaflet, dated March, 1917, has been issued by the Food Production Department of the Board:—

Loan of Horses to Farmers for Agricultural Work.

1. The Board of Agriculture desire to inform farmers that the War Office has made arrangements by which draught horses and mules with drivers may be placed temporarily at the disposal of farmers, in the vicinity of camps who require such assistance for farm work. The arrangement is subject to the Officer Commanding being satisfied that such horses and mules can be spared without prejudice to military requirements.

2. Horses and mules will be let out with their military drivers, or in cases where a skilled ploughman is available on the farm the Officer Commanding may at his discretion send out the horses without drivers. Where possible they will have to return to quarters each night, but in some cases the Officer Commanding may allow them to be stabled on the farm during the night.

3. The rates of payment will be as follows:—4*s.* for each horse or mule for a working day of not more than 8 hours, or 2*s.* 9*d.* a day in cases where the horses do not return to quarters at night (the farmer

to supply forage at his own expense, and, where necessary, proper stabling); 4*s.* a day for each soldier-driver, or, if the soldier is found board and lodging by the farmer, 2*s.* 6*d.* per day. Payment must be made at the end of each week to the cashier of the Command.

4. Applications for horses and drivers should be made by the farmer to the Commanding Officer of the nearest unit that is in possession of draught horses or mules. It should be noted particularly that the facilities are offered only to farmers in the neighbourhood of military stations or camps.

Slaughter of Calves.

THE Board of Agriculture and Fisheries have made an Order to operate on the 19th April which withdraws the restrictions on the slaughter of calves imposed by the Maintenance of Live Stock Orders of 1915 and 1916.

CEREAL FOODS.

The Barley (Requisition) Order, 1917.

THE Food Controller has issued an Order, dated 16th April, 1917, to the effect that:—1. All persons owning or having power to sell or dispose of any barley (other than home-grown barley which has not been kiln dried) shall place such barley at the disposal of the Food Controller, and shall deliver the same to him, or such persons as may be named by him, in such quantities and at such time as the Food Controller may from time to time require.

2. Pending any direction no person shall remove or otherwise dispose of any such barley (whether in pursuance of a contract existing at the date of this Order or not), and all persons concerned shall take such steps as may be reasonably necessary to maintain the same in good condition.

3. All persons owning or having to sell or dispose of such barley shall, on or before the 30th April, 1917, furnish to the Food Controller, Grosvenor House, Upper Grosvenor Street, London, W. 1, a statement on forms to be obtained from the Food Controller, giving particulars of all such barley in their possession or under their control at the date of this Order, and of all their existing contracts if any for the sale of such barley.

4. The Food Controller will subsequently communicate to the owners of barley taken over by him the prices which he will be prepared to pay for the same.

5. The arbitrator to determine in default of agreement the compensation to be paid for barley requisitioned under this Order shall be appointed by the Lord Chief Justice of England.

6. The Order shall not apply

(*a*) To persons who do not own more than 25 qr. (448 lb. per quarter) of barley at the date of the Order;

(*b*) To barley in the hands of or held to the order of flour millers at the date of this Order;

(*c*) To barley agreed to be sold to the Royal Commission on the Wheat Supply.

The Wheat, Rye, and Rice (Restriction) Order, 1917.

The Food Controller has issued an Order, dated 20th April, 1917, to the effect that except under the authority of the Food Controller, the following regulations shall be observed by all persons concerned :—

1. (*a*) No person shall use any wheat or rye except for the purpose of seed or except in the process of manufacturing flour.

(*b*) This clause shall not apply to tailings or screenings or to wheat or rye which has been so damaged as to be unsaleable for milling.

2. (*a*) No person shall, after the 28th April, 1917, use any wheaten flour, rye flour, rice or rice flour, except in the manufacture of articles suitable for human food, or use any article containing any wheaten flour, rye flour, rice or rice flour except as human food.

(*b*) This clause shall not apply to wheaten flour, rye flour, rice or rice flour which on the 28th April, 1917, had been so treated as to be unfit for the purposes of human food, or to any article which on the 28th April, 1917, is unfit for such purposes.

3. No person shall damage or permit to be damaged or, after the 28th April, 1917, treat or permit to be treated any wheat, wheaten flour, rye, rye flour, rice or rice flour, or any article containing wheaten flour, rye flour, rice or rice flour, so as to render the same less fit for the purposes for which under this Order it is reserved.

4. No person shall waste or permit to be wasted any flour or other article referred to in the last preceding clause.

5. Any person authorised by the Food Controller may take samples of any wheat, wheaten flour, rye, rye flour, rice or rice flour or other article which he has reason to suspect is being used, treated or damaged or is intended to be used, treated or damaged in contravention of this Order.

6. For the purposes of this Order the expression " Wheaten Flour " shall include any flour of which flour obtained from wheat forms part.

7. The Waste of Wheat Order, 1916, and the Wheat (Restriction) Order, 1917, are hereby revoked without prejudice to any proceedings in respect of any contravention thereof.

The Flour Mills Order, 1917.

The Food Controller has issued an Order, dated 20th April, 1917, to the effect that :—1. The provisions of Regulation 2GG of the Defence of the Realm Regulations are hereby applied as from the 30th April, 1917, to all flour mills in the United Kingdom which at the date of this Order use any wheat in the making of flour except mills the output capacity of which is less than 5 sacks of flour per hour.

Regulation 2GG *of the Defence of the Realm Regulations.*

2GG.—(1) Where the Food Controller is of opinion that it is necessary or expedient to do so for the purpose of his powers and duties, he may by Order apply the provisions of this Regulation to factories and workshops and other premises in which any article of food specified in the Order is manufactured or produced or adapted for sale ; and any such Order may apply either generally to all such factories, workshops and premises, or to any class or description of such factories, workshops and premises, or to any special factories, workshops and premises.

(2) Any factory, workshop or premises to which this Regulation is so applied shall by virtue of the Order pass into the possession of the Food Controller as from the date of the Order or from any later date mentioned in the Order, and the occupier of every such factory, workshop

or premises, and every officer of such occupier, and where the occupier is a company, every director of the company, shall comply with the directions of the Food Controller as to the management and user of the factory, workshop or premises, and if he fails to do so, he shall be guilty of a summary offence against these Regulations.

(3) It is hereby declared that the possession by the Food Controller under this Regulation of any factory, workshop or premises shall not affect any liability of the actual occupier thereof, under the Factory and Workshop Act, 1901, or any Act amending the same.

(4) Any Order of the Food Controller under this Regulation may be revoked or varied as occasion requires.

PRICES.

The Wheat, Barley, and Oats (Prices) Order, 1917.

THE Food Controller has issued an Order, dated 16th April, 1917, to the effect that :—1. Except under the authority of the Food Controller no wheat, barley (other than kiln barley) or oats harvested in the United Kingdom in the year 1916 may be sold at prices exceeding prices at the following rates : Wheat—78*s.* per quarter of 480 lb. ; Barley—65*s.* per quarter of 400 lb. ; Oats—55*s.* per quarter of 312 lb.

2. The buyer shall be entitled to require the grain to be placed on rail or (at the option of the seller) to be delivered to the buyer's premises, and no additional charge may be made in respect thereof.

3. Except in so far as the Food Controller may in any particular case otherwise determine, the following provision shall have effect in the case of any contract subsisting at the date of this Order for the sale of any of the grains mentioned where the contract price exceeds the permitted maximum price :—

The contract shall stand so far as concerns any such grain which has been paid for or has been delivered, or which under the contract is to be delivered within one month from the date of such contract, but otherwise shall be avoided.

4 No person shall sell or buy or offer to sell or buy any of the grain mentioned at a price exceeding the permitted maximum price or in connection with a sale or proposed sale of any such grain enter or offer to enter into any fictitious or artificial transaction or make any unreasonable charge.

The Seed Potatoes (Prices) Order (No. 2), 1917.

THE Food Controller issued an Order, dated 3rd April, 1917, to the effect that :—1. On and from the 1st April, 1917, all the prices referred to in the First Schedule to the Seed Potatoes (Prices) Order, 1917,* (hereinafter called the principal Order), shall be increased by the sum of £2, and such Order shall throughout take effect accordingly.

2. The date the 1st May, 1917, shall be submitted for the date the 1st April, 1917, in clause (*c*) of Article 14 of the principal Order, and in Article 11 of the Potatoes 1916 Main Crop (Prices) Order (No. 2), 1917, and for the date the 31st March, 1917, in clause (*d*) of Article 6 of the Seed Potatoes Order, 1916, as amended by the principal Order.

3. As from the 1st April, 1917, the expression "Seed Potatoes" shall, for the purposes of all the Orders referred to in Article 2, mean any potatoes which will not pass through a riddle having a one-inch mesh and will pass through a riddle having a two-inch mesh.

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* See *Journal*, March, 1917, p. 1280.

4. The Seed Potatoes (Growers' Prices) Order, 1917, shall, as regards Ireland, cease to be in force on the 1st May, 1917, and Articles 3, 4, 5 and 6 of the Potatoes (Ireland) Order, 1916, shall remain in force till that date.

5. This Order may be cited as the Seed Potatoes (Prices) Order (No. 2), 1917.

The Seed Potatoes (Prices) Order (No. 3), 1917.

BY the Seed Potatoes (Prices) Order (No. 3), 1917, dated 30th April, the Food Controller has extended until 1st June, 1917, the Orders regulating the prices at which seed potatoes may be sold.

Guaranteed Minimum Price for Potatoes.

A NUMBER of inquiries have been addressed to the Board of Agriculture and Fisheries as to the guaranteed minimum price for potatoes that was promised in the Prime Minister's speech in the House of Commons on 23rd February last. The President of the Board wishes it to be known that the promise is to be interpreted on the lines indicated by the previous offer made by the Food Controller, *i.e.* that the Government guarantees to the grower a price of £6 per ton f.o.r. or f.o.b. for all sound marketable ware potatoes grown in 1917, which will not pass through a 1¾-in. sieve, in lots of not less than 4 tons on and after 15th September. Detailed Regulations will be issued.

Farmers and Retail Sales of Potatoes.

THE Food Controller has announced that on the interpretation placed by his Department on the Potatoes 1916 Main Crop (Prices) Order (No. 2), 1917, a person who, in the ordinary way of business, sells potatoes by way of retail sales, is allowed, although he is the grower, to charge the maximum price of 1¾*d.* per lb.

CULTIVATION.

THE following Memorandum, dated 16th April, 1917, has been issued by the Food Production Department of the Board to War Agricultural Executive Committees:—

Temporary Entry on Land for Specific Acts of Cultivation.

It has been brought to the notice of the Department that some Executive Committees do not fully realise that the Cultivation of Lands Order, 1917 (No. 3), authorises them to enter *temporarily* on any land for the purpose of doing specific acts of cultivation or adaptation for cultivation, and to recover from the occupier such amount as represents the value to him of the work done.

In the Board's circular letter of the 23rd January last, (A290/C), reference was made to this power in paragraphs 14 and 15, and the Director-General thinks it desirable to call the attention of Committees to the matter again.

If Committees are of opinion, for instance, that certain fields should be ploughed by motor-tractors or other means, and the occupiers fail to enter into contracts with the Committee for the work to be done, the Committee may enter temporarily and do the work themselves. If the occupier refuses to pay the cost the Committee should take proceedings for recovery of the amount due in accordance with paragraph 4 of Regulation 2M.

Similarly, the power of temporary entry may be used for the purpose of applying fertilisers to any land or doing any other acts of cultivation or adaptation for cultivation.

Action on these lines may be taken by Committees without the necessity of obtaining the previous sanction of the Board in each case. In order to avoid any unnecessary delay it might be well for Committees, in connection with their ploughing programme, to pass a general resolution authorising entry under Regulation 2M on all the lands included in the programme, so that in case any of the farmers fail to sign contracts, entry may be made and the ploughing done forthwith without having to wait for the next meeting of the Committee. At the same time every endeavour should be made to conclude contracts with the farmers, so as to avoid the exercise of the powers of the Regulation except where absolutely necessary.

THE following Notice, dated April 26th, 1917, has been issued by the Food Production Department of the Board:—

Cultivation of Lands Order, 1917 (No. 2).*

Representations having been made to the Board of Agriculture and Fisheries to the effect that the period of the present year guaranteed to cultivators of small allotments provided under the Cultivation of Lands Order, 1917 (No. 2), is not sufficient to enable them to obtain a full return for their labour, Regulation 2L of the Defence of the Realm Regulations has been amended so as to extend the guarantee for a further period of twelve months.

"The first day of January, 1919," has been substituted for the "first day of January, 1918," in sub-section (3) of Regulation 2L, which now provides that a cultivator of land under the Regulation whose occupation is determined by or on behalf of the Board before the 1st January, 1919, shall receive from the Board such compensation as may have been agreed or, in default of any such agreement, as the Board may consider just and reasonable. A corresponding alteration has been made in Article 7 of the Cultivation of Lands Order, 1917 (No. 2).

With a view to economy of paper and labour the Board do not propose to communicate this amendment to each Local Authority concerned, and they ask that Municipal Boroughs, Urban District Councils, and other bodies to whom the Board's powers under Regulation 2L have been delegated, will note this intimation and will not consider it necessary to communicate with the Board in the matter.

THE Ministry of Munitions, which owns a very extensive tract of fertile agricultural land, in connection with a munitions factory in the North of England, is encouraging its tenants to cultivate hundreds of additional acres by assisting in the ploughing of the land with tractors.

Motor Ploughing under the Ministry of Munitions.

Four American Mogul tractors of 16 horse-power each, with Canadian "Cockshut" three-furrow ploughs attached, have been at work in this vicinity for two months, and, under the organisation and superintendence of Captain Shand, the resident land agent, who represents Sir Howard Frank, the Director-General of the Ministry of Munitions Lands, splendid work has been done.

The introduction of the tractors has aroused much interest amongst the agricultural community, and although at first farmers were somewhat sceptical, they have become quite enamoured of the new invention. So complete indeed has been their conversion that they are in frequent communication with the agent in charge of the work with a view to buying the tractors after he is done with them.

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* See *Journal* March, 1917, p. 1275.

On the Ministry lands the tractors are manned by Army Service Corps M. T. Drivers. Each tractor has a speed of about three miles per hour and the engines, which start on petrol, are worked by paraffin, the consumption of oil being about 2½ gal. per acre. Highly satisfactory work has been done on both lea and stubble land. The ploughs turn the land over to a depth of about 7 in., and the furrows are even, clean, and straight. The average amount ploughed in a full day under very adverse conditions has been 5 acres per tractor, but it has been ascertained that under ideal conditions each tractor can easily plough three-quarters of an acre in an hour. Although a certain amount of ploughing has been done after dusk, with the aid of acetylene lamps, much better results are attained by working in daylight, and, with the introduction of summer time, two shifts are now resorted to—the one from 4.30 a.m. till noon, and the other from noon till 8 p.m.

Besides being useful for ploughing the tractors will be of great assistance during harvest in hauling the binders, in threshing, and in taking the grain to the market.

LABOUR.

THE following Circular Letter, dated 27th March, 1917, has been addressed by the Food Production Department of the Board to the War Agricultural Executive Committees in England and Wales :—

Employment of National Service Volunteers in Agriculture.

SIR,—1. The Board of Agriculture have been in consultation with the National Service Department as to the arrangements by which farmers will be able to secure National Service Volunteers for Agricultural work, and the extent to which the help of War Agricultural Committees should be sought in connection with the Department's scheme.

2. Farmers who are desirous of employing National Service Volunteers (male) must apply on the proper form (NSVA 12), to be obtained from the War Agricultural Executive Committee of the county. The forms when filled in are to be returned to that Committee in order that they may have an opportunity of considering and recommending the relative importance of the applications. This will ensure that priority is given to the applications from farmers known to be most in need of additional labour. Subsequently the forms are to be forwarded by the Committee to the District Agricultural Commissioner of the National Service Department, and it will be the duty of that official to endeavour to supply each farmer concerned with the labour he requires.

3. The Circular Letter issued by the Board on the 2nd inst. relating to the provision of soldier labour, recommended that a Labour Sub-Committee should be appointed in each county, and this same body might be asked to deal with the applications of farmers for National Service Volunteers, as well as any future schemes for dealing with the supply of farm labour.

4. The information obtained by your War Agricultural Committee as the result of the recent County Survey, and any subsequent inquiries which have been made, will doubtless enable the Labour Sub-Committee to consider, without much trouble, the relative importance of the demands of farmers in your county for additional labour.

5. Should your Committee not possess the information necessary to enable them to determine which of the applications are most urgent the forms should be transmitted, with a note to that effect, to the National Service Department's Agricultural Commissioner.

6. The Board of Agriculture trust that your Committee will be prepared to undertake the work outlined above.

I am, etc.,
ARTHUR LEE,
Director-General of Food Production.

Soldier Labour.

THE following Memorandum, dated 31st March, 1917, has been addressed by the Food Production Department of the Board to War Agricultural Executive Committees in England and Wales:—

With reference to the Board's Circular Letter of the 2nd inst., relating to the provision of Soldier Labour, War Agricultural Executive Committees are informed that an Army Council Instruction (No. 525 of 1917) has been issued, pointing out to Commanding Officers that there is reason to think that in many cases where men of Agricultural Companies have been boarded and lodged by their employers, instead of the employer paying the "living-in" rate, he has been allowed to pay the "living-out" rate and have the soldiers billeted on him under Army conditions, the effect of which has been that the employer has paid less than the "living-in" rate.

Commanding Officers have, therefore, been instructed to take care that when men are provided with food and accommodation by their employers, billeting money is not to be paid, but the full amount of the "living-in" rate must be recovered from the employers.

When the employer provides lodging, cooking facilities (including fuel), and light *but not food*, he will be required to pay the "living-out" rate of wages for the men, but against this charge he will be credited with a sum equivalent to that which he would have received if the men had been formally billeted upon him under the Army Act, *i.e.*, 9*d.* per day for the first soldier, and 6*d.* for each additional soldier. A billeting notice will not be served on the farmer who employs the men.

In order to make the effect of this Regulation quite clear the following examples are given:—

1. Assuming the "living-out" rate in the district is 25*s.* and the "living-in" rate 10*s.* per week; the farmer who boards and lodges a soldier may have been permitted hitherto to deduct the billeting allowance of 19*s.* 3*d.* per week from the 25*s.* "living-out" rate, or in other words he has secured the services of the soldier for 5*s.* 9*d.* per week, plus the cost of keeping him, whereas the "living-in" rate for the district is known to be 10*s.* per week. In future the farmer will have to pay the local "living-in" rate, *viz.* 10*s.* per week.

2. Assuming the district rate of wage is 25*s.*, and a farmer has hired two soldiers whom he supplies with lodging, cooking facilities (including fuel) and light but *no food*—

	s.	*d.*	
For the first man he may deduct 9*d.* per day ..	5	3	per week.
For the second man he may deduct 6*d.* per day	3	6	"
	8	9	

so that the weekly sum due from him is 50*s.*, less 8*s.* 9*d.*—*i.e.*, 41*s.* 3*d.*

Employment of Civilian Prisoners of War in Agriculture.

FARMERS are reminded that the services of individual Civilian Prisoners of War are obtainable for agricultural work, and that it is most desirable that this form of labour should be taken advantage of to the greatest possible extent. Over 500 of these civilian prisoners are already being employed on farm work in various parts of the country, and reports received show that they are giving every satisfaction to their employers.

The Instruction hitherto in force providing that these men shall not be employed in prohibited areas has been modified to the extent that, although they cannot be released to work in prohibited areas in counties on the East Coast, their employment in prohibited areas elsewhere will now be considered, provided certain special conditions are observed. The employer must provide board and lodging, and pay the man at the current rate for English labourers in the district, less 12*s.* 3*d.* per week to meet the cost of board and lodging.

Farmers desirous of employing civilian prisoners should apply to the Secretary of the County War Agricultural Executive Committee for a form of application. The form, when completed and signed, should be sent to the Secretary, Prisoners of War Branch, Home Office, London, S.W.

Military Service (Review of Exceptions) Act, 1917.

THE following Memorandum, dated 28th April, 1917, has been sent by the Food Production Department of the Board to the Agricultural Executive Committees and to the Board's Representatives before the Appeal and Local Tribunals in England and Wales :—

1. It is desired to bring to the notice of all concerned the provisions of the Military Service (Review of Exceptions) Act, 1917, which received the Royal Assent on the 5th April, 1917.

2. The Act gives the Army Council power to call up for examination the following three classes of men excepted from the operation of the Military Service Acts, 1916, as being—

(*a*) a member of the territorial force who is, in the opinion of the Army Council, not suited for foreign service ; and

(*b*) a man (in this Act referred to as a disabled man) who has left or been discharged from the naval or military service of the Crown in consequence of disablement or ill-health (including an officer who has ceased to hold a commission in consequence of disablement or ill-health) ; and

(*c*) a man who has been previously rejected on any ground, either after offering himself for enlistment or after becoming subject to the Military Service Acts, 1916.

3. Any man to whom such a notice is sent and to whom it is applicable will, as from date of the Notice, come within the operation of the Military Service Acts, 1916. The Notice in question is described on the face of it as a Statutory Order (Army Form W.3579).

4. There are two exceptions from the above general powers, which will not extend to the following :—

(*a*) any man who is for the time being engaged in agriculture, and whose work is certified by the Board of Agriculture and Fisheries (or, as respects Scotland, the Board of Agriculture for Scotland) to be work of national importance, and who was engaged on such work on the thirty-first day of March, nineteen hundred and seventeen;

(*b*) or any officer or man who has left or been discharged from the naval or military service of the Crown in consequence of disablement if the disablement has been certified under the authority of the Admiralty or the Army Council to be the result of wounds (including injury from poisonous gas) received in battle or in any engagement with the enemy or otherwise from the enemy, or in consequence of neurasthenia or allied functional nerve disease if so certified by a special medical board to be the result of naval or military service in the present war; but any such man shall, notwithstanding anything in any Act or Regulation, be entitled to offer himself for re-enlistment if he is willing to do so, and to be re-enlisted.

5. In this Memorandum it is only proposed to deal with the procedure to be adopted with regard to the men in England and Wales who are excepted from the Act, for the reason that they come within paragraph 4 (*a*) above.

6. Although the local military authorities have lists in their possession as regards each area showing the men who are brought within the general provisions of the Act (see paragraph 2), they have no precise information as to which men are at present working on the land. It is, therefore, necessary to send a Statutory Order (see paragraph 3) to every man who comes within the general provisions of the Act.

7. If a man engaged in agriculture receives the Statutory Order he should complete the certificate on the back of the Order, if he claims that he is not liable to have the notice sent to him, and return the form to the Recruiting Officer.

8. The military authorities will then send to each County War Executive Committee full particulars of the men in the county who claim to be excepted from the Act on the ground that they were employed in agriculture on the 31st March, 1917, and that their work is of national importance. The Committee will by means of inquiries through the Board's Representatives before the Appeal and Local Tribunals, the Chairmen of the District Committees, or otherwise, ascertain whether each individual man was on the 31st March, 1917, and still is engaged whole time in agricultural work of national importance. Men engaged part time in cultivating a garden will not, of course, qualify for exception, and other analogous cases of part-time workers on the land will occur to the minds of the Committee.

9. If the Committee are satisfied that a man should be excepted they will issue a certificate that he is excepted from the provisions of the Act.

Copies of the form of certificate (F.P. 41) to be used will be supplied to Executive Committees on application to the Food Production Department, 72, Victoria Street, London, S.W. 1.

10. The Committee should complete their inquiries with all possible speed, and should issue the certificate, or notify the Recruiting Officer that they are not prepared to grant a certificate, within three weeks at the latest from the date of the receipt of the particulars from the Military Authorities.

11. The original certificate should be forwarded to the Recruiting Officer concerned, and a signed copy sent to the man himself.

12. If the Recruiting Officer objects in any individual case to the decision of the Executive Committee he will send particulars to the War Office, who will refer the matter to the Food Production Department.

13. If at a later date the Recruiting Officer has reason to believe that a man is no longer *for the time being* excepted from the provisions of the Act he will be justified in issuing a fresh Statutory Order to the man in question.

14. It is desired to impress on the Committee and the Agricultural Representatives the importance of this work being carried out in as expeditious and harmonious a manner as possible with the Recruiting Officers in order to avoid the trouble and delay of correspondence with the War Office and this Department.

15. It is not considered necessary to lay down any hard and fast rules for the guidance of the Committee as regards the particular agricultural occupations which are of national importance, but this Department rely on the Committee and the Agricultural Representatives to carry out their duties in respect of these certificates in the spirit as well as the letter of the provisions of this Memorandum.

THE National Service Department and the Board of Agriculture have issued the following directions in regard to women's work on the land under National Service:—

Women's Work on the Land.

1. *Selection.*—A recruit will sign one of the forms to be obtained at any post office.

2. She will receive a summons from the nearest employment exchange in her district to appear before a joint committee of the employment exchange and the District Selection and Allocation Committee of the Women's War Agricultural Committee at a particular hour on a certain day. Her railway ticket to the place mentioned will be sent to her.

3. She will be interviewed by the District Selection and Allocation Committee, who will consider whether she is physically fit for work on the land. If accepted for service the Committee will then decide :—

(*a*) That she is sufficiently skilled to go straight to a farm as a paid worker.

(*b*) That she is suitable for a bursary, *i.e.*, 15*s*. a week, and allocated direct to the approved farm on which she will work.

(*c*) That she requires four weeks' training at a centre.

4. *Medical Examination.*—The recruit is given a medical certificate which she must get filled in, either if she so wishes by her own doctor at her own expense or by one of the doctors on the Committee's panel nearest her home. She is also given a measurement form for her equipment to fill in at once. She is then given her return railway ticket and told to await further orders.

5. The recruit's medical certificate is posted by the doctor to the District Selection and Allocation Committee (whose secretary's address will be on the form).

If the recruit is passed as fit for land work the Committee carries out its decision of the interview.

The recruit who is to be sent to a four weeks' training centre will have all particulars, with her address, her medical certificate, her outfit, and measurements, sent to the Committee in the county town.

The Committee will send her instructions and a railway voucher. Her progress will be reported upon, and, if satisfactory, arrangements will be made to place her upon a farm as soon as she is ready. An endeavour will be made to place her locally. In all cases when the recruit is placed at work the district village registrar, or a welfare worker appointed for the purpose, will visit her, and should any difficulty arise try to meet her.

THE following Circular Letter, dated 30th March, 1917, was issued by the Food Production Department of the Board to the County War Agricultural Executive Committees :—

Women's Work on the Land.

SIR,—Now that the Women's Branch of the Board of Agriculture has been more fully organised, I beg to send you information as to the work at headquarters and throughout the country. The Branch has been made responsible as a section of the Food Production Department for the selection, training, and placing of the women who volunteer for land work under the National Service Scheme. Certain benefits are offered by the Government to the selected volunteers, such as free outfit, free instruction and maintainance, railway and travelling expenses in connection with employment, and maintenance at a hostel in between employment. To ensure efficient organisation for the work the Women's War Agricultural Committee in each County is asked to set up :—

An Executive with the following sub-Committees.

(i.) A County Selection and Allocation Committee with subsidiary Committees in the County Districts.
(ii.) An Instruction and Depot Committee.
(iii.) A Finance Committee.
(iv.) A Wages Committee.

Twelve Travelling Inspectors have been appointed for England and Wales, and attached to each county is a paid Organising Secretary, for whose work the Travelling Inspector is responsible.

The County Selection and Allocation Committee is charged with the work of :—

(*a*) Co-operating in the closest way with the Employment Exchanges.

(*b*) Selecting the National Service and other volunteers, arranging for their medical inspection and the provision of their outfit; for placing them through the County Instruction and Depot Committee into Training Centres, or straight on a farm with the Government allowance of 15*s*. a week for three weeks, paid to them while they are being instructed in their work by the farmer who afterwards employs them. This Committee also inspects the posts and arranges accommodation.

The Instruction and Depot Committee arranges for the training of the volunteers in various ways, in Agricultural Colleges and in Training Centres. It also organises a Depot to which the land workers can be sent if they are out of employment through no fault of their own. The outfit in some cases will be stored at the Depot; in other cases, a storeroom under the management of voluntary workers will be arranged.

The Finance Committee and its Treasurer, who must be approved by the Board of Agriculture, will make arrangements for the disbursements of such Government money as has been asigned to the use of the Women's War Agricultural Committee.

The Wages Committee shall meet and decide upon the fair current rate of wages for different types of work in the county. It is important that representatives of the War Agricultural Committee should join this Committee.

The existing organisation in the different counties, whereby District Representatives and Village Registrars have been appointed, is being strengthened.

Under the Treasury Grant it will be possible to appoint four Group Leaders in each county, who shall organise groups of part-time village women, go out themselves at the start, and, when moving to another centre, shall leave behind them a forewoman from among the village workers.

The Women's War Agricultural Committees are being asked to send forward the names of local farm workers, suitable to act as Group Leaders.

In consultation with the Department of National Service the Women's Branch is now arranging for a series of meetings in the county towns, for the issue of leaflets, and for Press propaganda, whereby women will be shown the present need of the country for increased food production, the appeal of the Government for their services, and the terms and conditions under which they can enrol in the Women's Land Army.

Every care will be taken that only suitable women are selected for farm work. Once selected, and instructed in the rudiments of the work, the help of the War Agricultural Committees must be secured to see that the women are employed. It is of the utmost importance, therefore, that the Men's and Women's County Agricultural Committees should work in close co-operation.

Attached is a list* of the Travelling Inspectors and Organising Secretaries now appointed, together with a copy of the card issued to women land workers by the National Service Department.

I am, etc.,
MERIEL L. TALBOT,
Director, Women's Branch,
Food Production Department.

MISCELLANEOUS.

The following Notice has been issued by the War Department:—

Wool of the 1917 Clip: Arrangements for Purchase by the Government.

The War Department desire to bring to the notice of farmers an Order made by the Army Council on 5th April (see below), under the Defence of the Realm Regulations, which prohibits all private dealings in wool grown in Great Britain, Ireland, or the Isle of Man, during the season 1917, and cancels all contracts that may have been made for the purchase of such wool.

As last year, the entire clip will be purchased for the Government by the Director of Army Contracts. The following arrangements have been made for England and Wales:—

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* Not here printed.

1. *Purchase.*—For the purpose of the collection of the clip, Great Britain will be divided into the same areas as last year with one exception, namely, that the counties of Derby, Notts, and Lincoln, instead of forming a separate area, will be included with the county of Yorkshire. Each area will be in charge of a District Executive Officer, who will superintend purchases on behalf of the Government. The District Executive Officer will be advised by a small committee, consisting of equal numbers of the leading merchants and farmers in the area. The leading merchants purchasing in each area will act as the agents for the Department for the purpose of collecting the wool.

2. *Price.*—The basis of prices has been fixed at 50 per cent. above the average prices ruling in June–July, 1914. A central price list for England and Wales, and local price lists for each area, are in course of preparation and will be published shortly.

3. *Census.*—For the purpose of collecting the wool, all holders of wool of the 1917 clip are required to fill up a Census Form giving information as to the number of their fleeces and where they are situated, and to return this Form to the District Executive Officer before 28th May. All such persons should have received Census Forms before 14th May, and any holder of raw wool who has not received a Form by that date should communicate at once with the District Executive Officer or with the local police, and ask for a copy.

4. *Delivery.*—In accordance with the terms of the Order, all holders of wool are required to sell and deliver all wool in their possession to the persons specified to them by or on behalf of the Director of Army Contracts. Any person refusing to sell or deliver his wool when so instructed, will render himself liable to prosecution. Farmers should not send in their wool to any authorised buyer until they receive instructions from the District Executive Officer as to when and where they should deliver it. All holders of small lots of under 50 fleeces (Wales, 200 fleeces) will be instructed to deliver before 31st July.

5. *Interest.*—Interest at the rate of 5 per cent. will be paid as from 1st September to all persons who are instructed to deliver their wool after that date.

Any communications on the subject of the purchase of the 1917 Wool Clip should be addressed either to the District Executive Officer for the area, or to the Director of Army Contracts, Raw Materials Section, Imperial House, Tothill Street, Westminster, S.W. 1.

Sale of Wool Order.

The following order, dated 5th April, has been issued by the Army Council:—1. No person shall sell raw wool grown or to be grown on sheep in Great Britain, Ireland, and the Isle of Man during the season of 1917, including fleece wool and skin wool, but not including daggings, locks, brokes and fallen wool, otherwise than to persons authorised by or on behalf of the Director of Army Contracts.

2. No person shall make or take delivery of or payment for any wool of the description aforesaid otherwise than in accordance with the provisions of this Order, whether in pursuance of any contracts entered into prior to the date hereof or otherwise.

3. All persons having in their custody or control any stocks of wool of the description aforesaid are hereby required to sell such wool to any persons authorised by or on behalf of the Director of Army Contracts as may be required by him or on his behalf, and to make deliveries to such persons in such quantities and at such times and places as may be specified by him or on his behalf.

4. No person shall mix or wind in any fleeces of the description aforesaid any brokes or dead wool, locks, dagging, or other matter whatsoever.

Control of Sheep and Lamb Pelts.

THE following Order, dated 9th April, has been issued by the Army Council:—The Army Council hereby require all persons engaged in the purchase or sale of pelts and wool skins taken from sheep or lambs killed in Great Britain to comply with the following Regulations from 16th April, 1917, until further notice: 1. No person shall purchase, sell, or make or take delivery of or payment for pelts of the description aforesaid at prices exceeding those set out in the Schedule hereunto annexed.

2. No person shall, without a permit issued by or on behalf of the the Director of Army Contracts, split or frise any pelt of the description other than extras of 10 lb. weight and upwards.

3. All persons engaged in splitting lamb or sheep skins or in dressing or tanning lamb skins, sheep skins or skiver or chamois leather shall furnish such particulars as to their business as may be required from time to time by or on behalf of the Director of Army Contracts.

SCHEDULE.

Sheep Pelts.						*Lamb Pelts.*					
English.			*Scotch.*			*English.*			*Scotch.*		
	s.	*d.*		*s.*	*d.*		*s.*	*d.*		*s.*	*d.*
Extras ..	4	6	Primes ..	3	8	Supers ..	2	8	Primes	2	5
1sts ..	3	6	Light Primes and 2nds	3	0	1sts ..	2	2	2nds ..	1	2
2nds ..	2	4				2nds ..	1	1			
3rds ..	1	2									

Cargo of Superphosphate at Hull.

THE following Notice, dated 1st May, has been issued by the Food Production Department of the Board:—

In view of the existing shortage of phosphatic fertilisers, the Director-General of Food Production has arranged for the importation into Hull of a cargo of some 4,500 tons of 30 per cent. superphosphate. The intention is that this shall be placed in farmers' hands at once for the benefit of the present season's crops, and to ensure its speedy distribution the manufacturers of fertilisers named below have agreed to deliver parcels *ex* this cargo at a price of £6 per ton, in bags, net cash in one month, delivered to consumers' station. Farmers should lose no time in placing their orders with one or other of the distributing firms, viz.:—

The Farmers' Company, Ltd., Barton-on-Humber.
G. H. Anderton, Ltd., Howden, Yorks.
The Goole Tillage Company, Goole.

(Copies of the following Notice in poster form for displaying in the barn, stable or cowshed can be obtained on application to the Secretary of the County War Agricultural Executive Committee.)

DEFENCE OF THE REALM.

TO FARMERS, HORSEMEN, STOCKMEN, LABOURERS.

Grow all the food you can. Save all the food you can. Do not give things men can eat, such as oats, barley or maize, to farm animals except when absolutely necessary. You must do with far less corn, meal and cake than you have been accustomed to give to your live-stock. Ships cannot be spared to bring you the usual supplies. Every handful grown or saved is a bullet used to good purpose in the great fight for freedom and justice.

Horses.—Give your horses enough food to keep them up to their work, but no more. Some horses need less than others; cut down their food and save the oats. Horses should always be turned out to grass when possible.

Milch Cows.—Full supplies of milk are necessary. Feed your milking cows well, but make the best use of green-stuffs and save cake and meal. Remember that a poor milking cow needs less food than a good milker. Do not give cake or meal to cows while they have plenty of good grass.

Other Cattle.—With other cattle a great saving of food must be made. No cake or meal should be given to store stock. Cattle should be sent to the butcher less fat than has been usual; prime beef is now an unpatriotic luxury.

Sheep.—Sheep and lambs should be kept on grass, roots, green-crops, hay and straw, with very little, if any, cake or corn, and sent for slaughter early.

Pigs.—Pigs should be fed on grass, green-stuffs, roots, whey, acorns, beech-nuts, scraps, and waste, and finished if necessary with a very little meal.

Poultry.—Keep no poultry except breeding stock and good layers. None should be fattened for table. Let your poultry live, as far as possible, on grass, stubbles and waste food.

The Germans are trying to starve us out; submarines are their last hope of escaping defeat. The success of our Army and Navy and the life of the Empire depend on the supply of food. Let there be no waste at home. No one wants compulsory rations either for man or beast. Good will and good sense can make them unnecessary. Do your part and there will be

NO FOOD-CARDS FOR ANIMALS.

(Signed) R. E. PROTHERO.

Provision of Sprayers and Spraying Materials.

IN order to assist allotment holders, cottage gardeners and small cultivators generally to protect their potato crops from attack by disease, the Department is making preparation for the provision of knapsack sprayers and spraying materials.

Societies and associations and groups of private individuals will be able to purchase a knapsack sprayer and enough material for spraying their potato crops. Free instruction will be given to purchasers in the use of a knapsack sprayer.

For particulars of the scheme applications should be made to the Director of Horticulture, Food Production Department, 72, Victoria Street, London, S.W. 1.

Rabbits and Rooks.

THE following Circular, dated 7th April, 1917, has been issued by the Food Production Department of the Board to War Agricultural Executive Committees in England and Wales :—

SIR,—The attention of this Department has been drawn to the danger caused by rabbits to the maintenance of the food supply. By Regulation 2R of the Defence of the Realm (Consolidation) Regulations, 1914, very wide powers have been conferred upon the Board of Agriculture to take such action as in their opinion may be necessary for the purpose of preventing injury to crops or trees or wastage of pasturage by rabbits and birds of various descriptions. Before, however, putting these powers into execution, it is desired that the landlords and shooting tenants should have an opportunity of so reducing the numbers of rabbits as to minimize the danger of injury to crops. Your Committee should, therefore, take all steps that may be possible to induce the landlords and shooting tenants to destroy the rabbits and to prevent their injuring the crops and pasturages, as they are now doing in many parts of the country. They should be asked to allow farming tenants to place traps in the banks of woodlands, on either side of the bank.

Another matter which causes anxiety is the damage done in various counties by the large number of rooks now in existence. County Executive Committees should use their influence with owners of rookeries to allow the birds to be reduced by one or other of the following methods.

The best method is to shoot the young rooks just before they are old enough to fly from the breeding places. If, however, shooting cannot easily be arranged, the nests should be destroyed or the rooks should be scared off their nests during any cold nights in the incubating season by lighting fires, firing guns, or otherwise; this method should be followed for two or three nights in succession, and would be sufficient to prevent the eggs from hatching.

Should your Committee find that a sufficient reduction of rabbits cannot be obtained with the voluntary co-operation of owners and shooting tenants, they are requested to furnish this Department with a report on the subject, in order that it may be considered whether the compulsory powers referred to should be put into active operation.

I am, etc.,

ARTHUR LEE,

Director-General.

THE following Memorandum, dated 7th April, 1917, has been issued by the Food Production Department of the Board to County Executive Committees in England and Wales:—

Rats and Sparrows. Attention is called to the great increase of rats and house sparrows in many parts of the country, and to the depredations committed upon crops by these pests. It is most important that every practicable means of conserving the national food supply should be adopted.

The arrangements for destruction which commend themselves to the Board of Agriculture and Fisheries are as follows:—

(1) The formation of rat and sparrow clubs as recommended in the Leaflet No. 84, issued by the Board of Agriculture and Fisheries;

(2) The appointment of a professional rat-catcher at a fixed weekly wage;

(3) The offering of rewards to other persons at rates which should not exceed:—

1*s*. per dozen rats' tails;
3*d*. „ heads of fully-fledged house sparrows;
2*d*. „ „ unfledged house sparrows;
1*d*. „ house sparrows' eggs.

If rewards are offered, great care must be taken to prevent fraud. Competent persons should be appointed who would be responsible for making the payments, and for ensuring that the tails, heads and eggs brought in are destroyed as soon as the reward has been paid, and are not taken away by the payee or by any other person, and they should be authorised to withhold payment and report any case in which there might be reason to suspect fraud.

If school children are set to work on the destruction of sparrows they should not be allowed to claim rewards, unless the work has been done under the direct supervision of the schoolmaster or schoolmistress; rewards for the destruction of rats should not be given to school children.

It should be borne in mind that the sparrow that does injury to crops and that requires to be destroyed is the common house sparrow.

While it is considered that the bulk of the expenditure can and should be defrayed by persons interested or from voluntary sources, no objection will be raised by the Local Government Board to reasonable expenditure by district or parish council or parish meetings in England and Wales which desire to assist in this work being defrayed out of the funds at their disposal. In view of the need for economising paper it has been thought inadvisable to send a circular to the large number of authorities concerned, and it will not be necessary for the authorities to communicate with the Department on the subject.

THE following Circular Letter, dated 11th April, 1917, has been addressed by the Director-General of Food Production to War Agricultural Executive Committees in England and Wales:—

Rats and Sparrows.

SIR,—A Memorandum has been sent to you, which has been prepared by this Department in conjunction with the Local Government Board, with regard to the destruction of rats and house sparrows. It will be observed that, while it is considered that the expense of destroying these pests should in general be borne by those interested, no objection will be raised to expenditure for this purpose being made out of the rates by urban and rural district councils, parish councils and parish meetings, provided the work is done according to one or more of the methods described in the Memorandum. A notice to the same effect has been published in the Press.

County Executive Committees should use their influence to induce the council or parish meeting of any area in which rats or house sparrows constitute a danger to crops to take active steps for their destruction.

Leaflet No. 84, which is referred to in the Memorandum, is being reprinted, and copies will be sent to you as soon as possible.

I am, etc.,
ARTHUR LEE,
Director-General.

THE following Memorandum, dated 7th April, 1917, was issued by the Food Production Department of the Board to War Agricultural County Executive Committees in England and Wales:—

Licences to Procure Lead Shot.

The accompanying model form of licence* for the supply of cartridges containing lead shot for the destruction of vermin and the preservation of crops is circulated. The Committees should arrange to print the number of forms likely to be required.

The Executive Committee should prepare a list of reliable firms who supply shot-gun ammunition in the county, and should arrange with those firms to note in the space provided for the purpose that the number of cartridges licensed has been supplied, and to return the licence to the Executive Committee when that has been done. A list of approved firms should be printed on the back of the licence, or in any other convenient space. The weight of shot per cartridge, and the number of cartridges licensed should be stated in each licence issued.

It is not necessary to confine the issue of these licences to farmers, but care should be taken only to license those persons to obtain cartridges who require them *bona fide* for the preservation of crops. It is not intended to license supply of cartridges in order to destroy vermin for the preservation of game.

THE following Circular Letter, dated 3rd April, 1917, was addressed by the Food Production Department to War Agricultural Executive Committees in England and Wales:—

Manufacture of Lead Shot for Cartridges.

SIR,—I am directed to say that in order to restrict the manufacture of lead shot as far as possible, the Ministry of Munitions have decided only to grant sanction for its manufacture in cases where cartridges are required for the destruction of vermin or the preservation of crops.

County Executive Committees are empowered to issue licences, which should be signed by the Chairman of the Committee, to farmers who require to be supplied with cartridges for these purposes. Such licences should only be granted when it is considered to be absolutely necessary for the protection of crops that the farmer should be supplied with the cartridges required. The licence should state the number of cartridges authorised by the Committee and should specify the description of shot to be supplied.

---

* Not here printed.

I am to ask that County Executive Committees will confine the issue of licences to the supply of the number of cartridges which is strictly necessary for the purpose named.

I am, etc.,
F. L. C. FLOUD,
Assistant Secretary.

THE following Memoranda, dated 30th April, have been addressed to the Agricultural Executive Committees by the Food Production Department of the Board:—

Shots and Cartridges for Protection of Crops from Animal Pests.

The Department have taken up with the Priority Branch of the Ministry of Munitions the question of supplies of shot and cartridges to dealers for the purpose of sale to persons who have received licences from Agricultural Executive Committees to purchase shot or cartridges for the preservation of crops. It is understood that there are sufficient stocks in the country both of loose shot and cartridges to meet present demands; and that the arrangement for the supply of these to dealers are being conducted by the Priority Branch of the Ministry of Munitions through two trade associations.

Any dealers who ask for the help of the Agricultural Executive Committee in order to obtain shot or cartridges for the above purpose should be advised to apply either to:—

The Gunmakers' Association (1912), Ltd. (F. B. Bosworth, Secretary), 23, St. Swithin's Lane, London, E.C.; or to,

The Ironmongers' Association (R. H. Smith, Secretary), Apsley House, Priory Road, Sheffield.

Wire-netting.

THE Priority Branch of the Ministry of Munitions are receiving numerous applications for permits for the purchase of wire-netting. No such permit is required. Although manufacture is not permitted, arrangements have been made to enable wire-netting to be purchased from stock if required for protecting the food crops, or for sheep-netting, but for no other purpose.

Journal Supplement on Grass Land and Ploughed Land.

IN view of the necessity of increasing our arable area by the breaking up of pastures, it has been considered desirable by the Board to publish a review of the situation with regard to grass land in this country, including an account of recent experiments bearing on the subject. To this end the Board have issued as a Supplement to the May *Journal* a Memorandum by Mr. R. G. Stapledon, M.A., entitled "Grass Land and Ploughed Land." After classifying and describing the various types of grass land, Mr. Stapledon deals with the possibility of their improvement by good management, and by bringing them into the rotation. Directions are also given for the choice and purchase of seed mixtures.

The Supplement will be sent free to subscribers to the *Journal* on written application, and may be obtained by non-subscribers for 4*d.* post free from 3, St. James' Square, London, S.W. 1.

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad.

The *International Crop Report and Agricultural Statistics* for April, 1917, issued by the International Institute of Agriculture, contains particulars of the production of cereal crops in the Southern Hemisphere in 1916-17.

Wheat.—In Argentina, Australia, and New Zealand the total production is placed at 28,456,000 qr. in 1916-17, against 44,911,000 qr. in 1915-16, a decrease of 36·6 per cent.

Oats.—In the above-mentioned countries the production is estimated at 6,086,000 qr. in 1916-17, compared with 10,750,000 qr. in 1915-16, a reduction of 43·4 per cent.

Maize.—The production in Argentina and Australia is estimated to amount to 7,854,000 qr. in 1916-17, against 19,587,000 qr. in 1915-16, a decrease of 59·9 per cent.

Sowing of Winter Cereals in the Northern Hemisphere.—The areas estimated to have been sown with winter *wheat* in 1916-17, compared with the areas sown during the corresponding period of 1915-16, expressed as percentages, are as follows: Denmark 93, Spain 103, France 85, England and Wales 86, Scotland 87, Switzerland 105, Canada 82, United States 102, India 109, Japan 100; with *rye*—Denmark 95, Spain 99, France 90, Switzerland 105, United States 121; with *barley*—Spain 89, France 110, Switzerland 106, Japan 88; with *oats*—Spain 98, France 95, United States 79.

British India.—The total production of wheat in 1917 is estimated at 46,322,000 qr., or an increase of 16·6 per cent. compared with 1916, when it amounted to 39,739,000 qr., while the area sown was greater by 9·4 per cent.

France.—According to an official report the conditions of the crops on 1st April was as follows (figures for 1st April, 1916, in brackets for comparison): Winter wheat, 54 (69); rye, 62 (70); winter barley, 56 (71); and winter oats, 52 (70). (80 = good, 60 = fairly good, 50 = passable). (*London Grain, Seed and Oil Reporter*, 1st May.).

Canada.—The High Commissioner for Canada, in a report dated 3rd May, states that in some districts of Southern Alberta 75 per cent. of the wheat sowing has been completed.

United States.—According to a report issued by the Statistical Bureau of the Department of Agriculture, the condition of winter wheat on 1st May was 73·2, compared with 63·4 on 1st April, 1917, and 82·4 on 1st May last year. The area of winter wheat on 1st May was estimated at 27,653,000 acres, or 31 per cent. less than the area planted in the autumn, and 7,000,000 acres less than the area harvested last year. The condition of rye was 88·8 compared with 86·0 on 1st April, and 88·7 on 1st May, 1916. About 72·4 per cent. of the spring ploughing was completed by 1st May, compared with 70·4 per cent. in 1916 and 78·3 per cent. in 1915, whilst 58·7 per cent. of the spring planting was done by 1st May. (*London Grain, Seed and Oil Reporter*, 8th May).

Agricultural Conditions in England and Wales on 1st May.

THE Crop Reporters of the Board, in commenting on agricultural conditions in England and Wales on the 1st May, state that the cold and snow hindered work on the land for nearly two-thirds of April. The last ten days were, however, very favourable, and good progress was made everywhere; the land worked very well, and a good seed-bed was almost universally obtained. Wheat, on the whole, is rather a poor plant; that sown early in the autumn is mostly satisfactory, but the later-sown is not promising, and some fields have had to be re-sown. Winter oats have been a good deal damaged. Spring corn is only just showing in many districts, and it is early to speak of its prospects; though it appears to be mostly satisfactory. The area under oats is expected ultimately to be 8 or 9 per cent. greater than last year; but a considerable area, both of this crop and barley, still remains to be sown in the northern districts more particularly. Beans and peas seem fairly satisfactory, though beans have in some cases suffered from the frost.

Considerable progress has been made with potato planting in the south and in Lincolnshire, but much less in the north, and in some places, in fact, it has hardly begun. The work is being carried on under very favourable conditions.

Seeds have suffered a good deal from the severe weather in the north, and some fields have been ploughed up. They are now starting to grow, however, and prospects are fairly satisfactory generally in the south. With better weather, a considerable improvement may be looked for.

Pastures are very bare, and hardly commenced to grow before the end of the month. Owing to the prolonged cold, winter keep was getting very short, and live stock generally were only in poor condition.

The fall of lambs was generally about average, or perhaps even somewhat over, but the severe weather caused considerable losses, except in some favoured southern counties. Losses occurred also among the ewes, and as the trying conditions rendered their condition generally rather poor, there were many complaints of shortage of milk, which was partly responsible for the mortality among the lambs. Hill flocks had a particularly trying time owing to the lateness of the season, and they suffered considerable losses.

Agricultural Labour in England and Wales during April.

Northumberland, Durham, Cumberland, and Westmorland.—The supply of labour is very short, and at the recent hirings wages rose considerably. Great help has been given by soldiers in many districts.

Lancashire and Cheshire.—Labour is generally short, but the deficiency has to some extent been made good by the employment of soldiers, women and children.

Yorkshire.—The deficiency in the supply of labour is now being much felt, especially as regards horsemen in the East Riding, but the situation has been considerably relieved by the use of soldier labour.

Shropshire, and Stafford.—The supply of labour is very short, but welcome assistance has been given by soldiers and women.

Derby, Nottingham, Leicester, and Rutland.—The supply of labour is deficient, but soldiers and women are affording great help.

Lincoln and Norfolk.—With military help the supply of labour is just about sufficient to carry on necessary work.

Suffolk, Cambridge, and Huntingdon.—The supply of labour is deficient. The help of soldiers has been very beneficial, and has eased matters considerably.

Bedford, Northampton, and Warwick.—The supply is deficient, but the assistance given by soldiers and women has been of great service to farmers generally.

Buckingham, Oxford, and Berkshire.—There is still a general deficiency, but good help has been rendered by soldiers and women.

Worcester, Hereford, and Gloucester.—Labour is generally deficient, but the shortage has been met by the employment of soldiers and female labour, which has proved of great service.

Cornwall, Devon, and Somerset.—The supply of labour is generally short, but the deficiency has been met to a large extent by the employment of soldiers, women and school-children. Wages show an upward tendency.

Dorset, Wiltshire, and Hampshire.—The supply of labour is short, but the employment of women and the release of soldiers for agricultural work has greatly relieved the situation.

Surrey, Kent, and Sussex.—Labour is generally short and horsemen and stockmen difficult to obtain. Considerable assistance has been rendered by the military and by women, which has mitigated the general deficiency.

Essex, Hertford, and Middlesex.—The supply continues to be scarce, especially temporary labour.

North Wales.—With the help of soldiers the labour situation has not been critical, but still farm workers are scarce.

Mid-Wales.—Great assistance has been given by soldiers and women, but the supply of labour is still short.

South Wales.—The temporary release of soldiers for farm work has been of great assistance to farmers, and the fine weather has enabled good use to be made of this help, but otherwise the supply of labour is very deficient.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st May, 1917, certain diseases of animals existed in the countries specified:—

Denmark (month of February).—Anthrax, Foot-and-Mouth Disease, Swine Erysipelas, Swine Fever.

France (for the period 18th March—7th April).—Anthrax, Blackleg, Foot-and-Mouth Disease, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-scab, Swine Erysipelas, Swine Fever.

Holland (month of March).—Anthrax, Foot-and-Mouth Disease, Foot-rot, Glanders and Farcy, Swine Erysipelas.

Italy (for the period 26th March—1st April).—Anthrax, Black-leg, Foot-and-Mouth Disease (647 outbreaks), Glanders and Farcy, Rabies, Sheep-scab, Swine Fever.

Norway (*month of March*).—Anthrax.

Russia (*month of October*).—Anthrax, Cattle-plague, Foot-and-Mouth Disease (50,680 animals), Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine Fever.

Sweden (*month of March*).—Anthrax, Black-leg, Swine Fever.

Switzerland (*for the period 19th—25th March*).—Black-leg, Swine Fever.

No further returns have been received in respect of the following countries: Austria, Belgium, Bulgaria, Germany, Hungary, Montenegro, Rumania, Serbia, Spain.

The Weather in England during April.

District.	Temperature		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm *	Mm.*		Hours	Hours.
Week ending 7th April:								
England, N E.	32·9	- 10·2	0·71	18	+11	5	4·0	—1·6
England, E.	35·7	—8·2	0·70	18	+11	5	4·6	—1·0
Midland Counties ...	34 8	—9·3	0·49	12	+ 3	3	4·9	—0·1
England, S.E. ...	36·8	—8·8	0·91	23	+15	5	4·5	—1·0
England, N W. ...	34·2	- 9·9	0 52	13	+ 2	4	4·7	—0·5
England, S.W. ...	36·6	—8·6	0·76	19	+ 6	5	5·8	+0·7
English Channel ...	40·2	—7·3	0 66	17	+ 7	5	6·3	+1·3
Week ending 14th April:								
England, N.E ...	37·5	— 6·4	0·70	18	+ 8	7	4·6	+0·4
England, E.	37·7	—7·0	0·65	16	+ 6	6	4·6	—0 6
Midland Counties ...	37·5	—7·2	0·84	21	+11	6	5·4	+0·7
England, S.E. ...	38·8	—7·0	0·77	20	+11	6	5·5	+0·2
England, N.W. ...	37·0	—7·3	0·99	25	+13	6	4·3	—0·7
England, S.W. ...	38·6	—7·2	0·79	20	+ 7	6	6·0	+0·5
English Channel ...	41·7	—6·3	0·86	22	+12	6	6·8	+0·5
Week ending 21st April:								
England, N.E. ...	41·5	—3·2	0·40	10	+ 2	4	4·8	—0·4
England, E.	41·5	—4·3	0·56	14	+ 7	4	4·5	—1·1
Midland Counties ...	43·1	—2.7	0·31	8	0	3	5·2	+0·2
England, S.E. ...	44·2	—2·7	0·35	8	+ 1	3	4·7	—1·1
England, N.W. ...	43·1	—2·7	0·56	14	+ 4	4	5·0	—0·5
England, S.W. ...	44·4	—2·3	0·31	8	— 3	4	6·8	+1·2
English Channel ...	46·5	—1·2	0·14	3	— 7	3	7·8	+1·2
Week ending 28th April:								
England, N E. ...	46·5	+0·5	0·02	1	—10	1	3·1	—2·2
England, E.	44·2	—3·2	0·00	0	—12	0	5·1	—0·3
Midland Counties ...	47·6	+0·1	0·00	0	—13	0	2·5	—2·9
England, S.E. ...	45·6	—2·8	0·00	0	—14	0	6·5	+0·4
England, N.W. ...	47·1	0·0	0·00	0	—14	0	4·1	—1·1
England, S.W. ...	48·0	—0·1	0·00	0	—19	0	2·3	—2·8
English Channel ...	47·8	—2·1	0·00	0	—14	0	10·2	+4·5

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	APRIL.		FOUR MONTHS ENDED APRIL.	
	1917.	1916.	1917.	1916.
Anthrax :—				
Outbreaks	50	53	230	221
Animals attacked	54	59	265	260
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	1
Animals attacked ...	—	—	—	24
Glanders (including Farcy) :—				
Outbreaks...	1	2	9	21
Animals attacked	5	4	19	62
Parasitic Mange :—				
Outbreaks	186	161	1,201	1,162
Animals attacked	392	350	2,543	2,824
Sheep-Scab:—				
Outbreaks	26	16	348	165
Swine Fever :—				
Outbreaks	287	445	840	1,523
Swine slaughtered as diseased or exposed to infection	148	1,315	344	4,691

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	APRIL.		FOUR MONTHS ENDED APRIL.	
	1917.	1916.	1917.	1916.
Anthrax :—				
Outbreaks	—	—	2	1
Animals attacked	—	—	2	5
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy) :—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	—
Parasitic Mange :—				
Outbreaks	1	6	16	28
Sheep-Scab :—				
Outbreaks	27	28	193	200
Swine Fever :				
Outbreaks	50	41	108	100
Swine slaughtered as diseased or exposed to infection	374	236	741	530

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in April and March, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	April. First Quality.	April. Second Quality.	March. First Quality.	March. Second Quality.
FAT STOCK :—	per stone.*	per stone.*	per stone.*	per stone.*
Cattle :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Polled Scots	17 0	16 3	17 5	16 4
Herefords	16 9	15 5	16 9	15 7
Shorthorns	16 11	15 8	17 0	15 9
Devons	17 1	15 6	16 9	15 5
Welsh Runts	16 11	15 0	17 0	15 5
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	15¼	13½	—	—
Sheep :—				
Downs	15⅛	14¼	15¼	14
Longwools	14¼	13¼	14¾	13⅛
Cheviots	16¾	15⅛	16⅛	15¼
Blackfaced	16¾	15¼	15¾	14½
Welsh	16	14⅛	15¼	13¾
Cross-breds	15¾	14¼	15⅛	14¼
	per stone.*	per stone.*	per stone.*	per stone.*
Pigs :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Bacon Pigs	16 1	15 2	15 10	15 0
Porkers	16 8	15 10	16 6	15 9
LEAN STOCK :—	per head.	per head.	per head.	per head
Milking Cows :—	*£ s.*	*£ s.*	*£ s.*	*£ s.*
Shorthorns—In Milk ...	41 18	33 5	41 18	33 3
,, —Calvers ...	40 1	31 15	38 12	30 9
Other Breeds—In Milk ...	43 1	31 17	43 1	31 17
,, —Calvers ...	27 10	26 0	29 10	27 0
Calves for Rearing	3 12	2 16	3 10	2 15
Store Cattle :—				
Shorthorns—Yearlings ...	16 18	14 18	17 0	14 18
,, —Two-year-olds...	26 14	22 16	26 11	23 0
,, —Three-year-olds	35 12	29 11	34 9	28 10
Herefords —Two-year-olds...	30 5	24 5	29 2	23 9
Devons— ,,	28 9	23 12	30 18	25 16
Welsh Runts— ,,	25 18	23 1	25 19	22 14
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Downs or Longwools ...	70 7	61 11	73 9	62 3
Store Pigs :—				
8 to 12 weeks old	36 3	28 3	35 11	27 7
12 to 16 ,, ,, ...	59 7	46 8	60 7	47 6

* Estimated carcass weight.

AVERAGE PRICES OF DEAD MEAT at certain MARKETS in ENGLAND in April, 1917.

(*Compiled from Reports received from the Board's Market Reporters*).

Description	Quality	Birmingham.		Leeds.		Liverpool.		London.		Manchester.	
		per cwt.		per cwt.		per cwt.		per cwt.		per cwt.	
		s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
BEEF :—											
English	1st	120	0	116	0	123	6	118	6	118	6
	2nd	115	6	113	0	114	6	113	6	111	0
Cow and Bull	1st	111	6	110	0	106	0	105	0	105	0
	2nd	106	0	106	0	86	6	100	6	95	6
Irish: Port Killed	1st	—		116	6	117	0	116	6	115	0
	2nd	—		111	0	108	6	111	6	109	6
Argentine Frozen—											
Hind Quarters	1st	—		—		—		102	6	—	
Fore ,,	1st	—		—		—		93	6	—	
Argentine Chilled—											
Hind Quarters	1st	106	0	105	6	106	6	105	0	106	6
Fore ,,	1st	95	0	95	6	95	0	93	6	95	0
American Chilled—											
Hind Quarters	1st	—		—		—		107	6	—	
Fore ,,	1st	—		—		—		94	6	—	
VEAL :—											
British	1st	130	6	116	6	116	0	125	0	—	
	2nd	118	0	105	6	94	6	106	0	101	6
Foreign	1st	—		—		—		—		—	
MUTTON :—											
Scotch	1st	128	6	127	0	147	0	137	6	147	0
	2nd	123	6	118	0	128	6	128	6	142	6
English	1st	126	0	127	0	140	0	129	6	135	6
	2nd	120	0	118	0	123	0	120	0	122	6
Irish: Port Killed	1st	—		—		134	0	—		135	6
	2nd	—		—		119	0	—		126	0
Argentine Frozen	1st	115	6	—		113	0	110	0	113	0
New Zealand ,,	1st	86	6	—		87	6	87	6	87	6
Australian ,,	1st	—		—		—		—		—	
LAMB :—											
British	1st	149	6	143	0	154	0	151	6	149	6
	2nd	140	0	—		144	6	142	6	140	0
New Zealand	1st	100	6	—		98	0	98	0	98	0
Australian	1st	100	6	—		98	0	98	0	98	0
Argentine	1st	135	6	—		127	0	127	0	127	0
PORK :—											
British	1st	137	6	130	6	132	0	133	0	132	0
	2nd	129	6	121	6	116	6	120	0	121	6
Frozen	1st	102	6	105	6	105	0	103	0	107	6

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in April, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality	Second Quality	First Quality.	Second Quality.	First Quality	Second Quality
	s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
BUTTER :—	per 12 lb	per 12 lb	per 12 lb	per 12 lb	per 12 lb	per 12 lb.
British	—	—	—	—	23 6	22 6
	per cwt	per cwt.	per cwt	per cwt	per cwt	per cwt
Irish Creamery—Fresh	—	—	203 0	199 0	—	—
,, Factory... ...	—	—	189 0	186 6	—	—
Danish	—	—	215 6	212 6	214 6	209 6
French	—	—	—	—	217 0	212 0
Dutch	—	—	—	—	208 0	202 0
American	—	—	—	—	—	—
Australian	210 0	207 6	206 6	201 6	199 0	193 0
New Zealand... ...	218 6	215 0	215 6	212 0	211 6	206 6
Argentine	—	—	208 0	205 6	198 0	193 6
CHEESE :						
British—						
Cheddar ...	168 0	165 0	170 0	165 0	165 0	—
			120 lb.	120 lb	120 lb.	120 lb.
Cheshire ...	—	—	169 0	156 0	176 6	—
			per cwt	per cwt.	per cwt	per cwt.
Canadian	162 0	160 0	162 0	160 0	162 0	—
BACON :—						
Irish (Green)	143 6	—	145 0	143 0	142 6	139 0
Canadian (Green sides)	136 6	—	136 0	—	136 6	134 6
HAMS.—						
York (Dried or Smoked)	—	—	—	—	190 0	180 0
Irish (Dried or Smoked)	—	—	—	—	160 0	156 0
American (Green) (long cut)	128 0	124 0	129 0	—	129 6	126 6
EGGS :—	per 120.	per 120.	per 120	per 120.	per 120	per 120.
British...	—	—	—	—	20 5	18 11
Irish	19 4	—	19 6	18 6	19 10	18 10
Egyptian	13 0	—	12 10	11 7	14 0	13 0
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	—	—	—	—	242 0	—
Edward VII.	—	—	—	—	242 0	—
Evergood	—	—	—	—	242 0	—
HAY :—						
Clover...	—	—	150 0	140 0	140 6	131 6
Meadow	—	—	—	—	139 6	130 6

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1915, 1916 and 1917.

Weeks ended (*in* 1917).	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915		1916.		1917.		1915.		1916.		1917.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan. 6 ...	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
,, 13 ...	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
,, 20 ...	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
,, 27 ...	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb. 3 ...	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
,, 10 ...	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
,, 17 ...	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
,, 24 ...	56	0	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar. 3 ...	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
,, 10 ...	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
,, 17 ...	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
,, 24 ...	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
,, 31 ...	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl. 7 ...	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
,, 14 ...	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
,, 21 ...	56	5	55	3	84	10	31	5	52	10	70	6	30	11	31	8	59	8
,, 28 ...	58	3	56	3	81	1	32	7	53	5	69	5	31	5	32	4	58	6
May 5 ..	60	5	55	7	77	7	33	3	53	1	64	4	32	4	32	10	54	9
,, 12 ...	61	7	55	5	78	0	34	0	53	5	64	11	32	5	33	1	55	2
,, 19 ...	62	0	55	0			34	1	52	10			32	8	33	0		
,, 26 ...	61	11	54	7			34	8	52	9			32	7	33	4		
June 2 ...	61	9	53	3			35	4	53	9			32	5	33	3		
,, 9 ...	60	1	51	2			34	5	52	8			32	4	32	7		
,, 16 ...	56	1	48	10			34	3	50	9			31	9	32	1		
,, 23 ...	52	0	47	6			34	4	49	10			31	9	31	3		
,, 30 ...	49	5	46	3			35	3	49	1			31	1	30	10		
July 7 ...	50	1	46	3			34	7	45	6			31	6	30	8		
,, 14 ...	52	7	48	11			35	8	47	5			31	6	31	6		
,, 21 ..	53	10	51	6			35	10	48	8			32	1	32	3		
,, 28 ...	55	3	53	5			36	1	47	2			31	1	32	5		
Aug. 4 ...	55	4	55	1			35	7	46	1			31	5	32	9		
,, 11 ...	55	2	56	7			37	0	46	11			31	7	31	2		
,, 18 ...	54	3	58	1			39	4	48	0			31	4	30	8		
,, 25 ...	51	11	59	0			38	3	47	1			30	0	31	6		
Sept 1 ...	45	3	59	4			38	1	48	5			26	10	30	5		
,, 8 ...	43	0	59	3			37	11	51	7			26	8	31	1		
,, 15 ...	42	9	59	11			39	0	52	6			26	4	30	9		
,, 22 ...	43	3	59	4			39	8	53	3			26	1	30	9		
,, 29 ...	43	5	58	10			40	4	54	1			26	5	31	1		
Oct. 6 ...	44	1	59	2			41	0	54	5			26	5	30	9		
,, 13 ...	45	9	59	7			42	3	53	10			27	1	31	6		
,, 20 ...	48	2	60	9			44	0	53	8			28	1	31	11		
,, 27 ...	50	3	62	10			46	2	54	6			29	1	32	10		
Nov. 3 ...	51	6	66	7			47	3	56	2			30	4	34	0		
,, 10 ...	52	8	69	8			47	5	58	0			30	11	35	8		
,, 17 ...	53	6	70	9			47	11	59	8			31	3	37	8		
,, 24 ...	54	2	70	8			48	7	61	8			31	1	39	7		
Dec. 1 ..	53	7	71	3			48	11	63	1			30	11	41	4		
,, 8 ...	52	10	72	1			47	10	65	6			30	4	44	1		
,, 15 ...	53	11	73	2			47	5	66	5			30	6	45	10		
,, 22 ...	53	10	74	8			47	2	67	3			30	7	46	5		
,, 29 ...	54	9	75	10			47	5	67	5			30	10	47	4		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

AVERAGE PRICES of **British Wheat, Barley, and Oats** at certain Markets during the Month of April, 1915, 1916, and 1917.

—	WHEAT.						BARLEY.						OATS.					
	1915		1916		1917		1915		1916.		1917		1915		1916.		1917	
	s	d.	s	d.	s.	d	s	d	s.	d	s.	d	s.	d.	s	d	s.	d.
London	56	11	53	11	86	2	32	9	52	8	71	8	32	2	33	7	59	10
Norwich .	54	7	53	4	82	6	30	5	51	2	68	10	30	6	31	3	57	0
Peterborough	55	8	53	7	82	7	30	3	51	7	66	7	30	11	31	6	58	11
Lincoln	56	5	55	5	83	8	30	10	54	3	69	4	30	8	31	5	58	1
Doncaster .	54	11	53	1	84	11	30	0	54	8	70	1	29	3	30	0	56	9
Salisbury	53	8	53	5	82	7	31	11	50	10	68	6	31	7	30	9	57	4

ADDITIONS TO THE LIBRARY.

Agriculture, General and Miscellaneous—

McCall, A G—Field and Laboratory Studies of Soils An Elementary Manual for Students of Agriculture (77 pp) New York J Wiley & Sons , London Chapman & Hall, 1915 2*s* 6*d*. net [63.11(02).]

Giltner W—Laboratory Manual in General Microbiology. (418 pp.) [Laboratory of Bacteriology Hygiene and Pathology, Michigan Agricultural College.] New York J. Wiley & Sons , London Chapman & Hall 1916. 10*s*. 6*d*. net. [576 8.]

Rastall, R. H.—Agricultural Geology. (331 pp) [Cambridge Geological Series] Cambridge University Press, 1916. 10*s*. 6*d*. net [55 , 63 111]

Jones E , and *Griffith, J. J.*—Chemistry for Rural Schools (184 pp.) London Blackie & Son, 1916. 2*s*. 6*d*. net. [54(02)]

Graham P A—Reclaiming the Waste. (175 pp.) London "Country Life" Offices 1916. 3*s*. 6*d*. net. [63 12.]

Dannatt, W—Practical Hints from the Notebook of an Old Farmer. (85 pp) London "The Field and Queen" (Horace Cox), 1914. 3*s*. 6*d*. net. [63(022)]

Field Crops—

Holmes, E. M.—Medicinal Herbs Their Cultivation and Preparation in Great Britain. (12 pp.) [Extracted from the Journal of the Royal Horticultural Society, Vol. xlii.] London W. Wesley & Son, 1916. 6*d*. [63.348]

Chamberlain, Mrs. T., and *Wheelwright, Miss E. C.*—Herb-collecting for Boys and Girls. (8 pp.) London The Herb-growing Association, 1916. 2*d*. [63 348.]

Teetgen, Ada B—Profitable Herb Growing and Collecting. (180 pp.) London "Country Life," 1916. 3*s*. 6*d*. net [63.348]

Horticulture—

Wyldon, H.—Sugarless Jam-making : Fruit and Vegetable Bottling and Corn Syrup Preserves. (24 pp.) London Polsue, 1916. 1*s*. net. [664.85.]

Nanot, J., et *Gatin, C. L.*—Le Séchage des Fruits et des Légumes. (324 pp.) Paris Libraire Agricole de la Maison Rustique, 1916. Fr. 3.50. [664.85.]

Emptage, W. F.—Commercial Fruit Growing on the Small Holding. (62 pp.) London . "The Fruit Grower" [1916]. 1*s*. 6*d*. net. [63.41(02).]

University of Leeds and the Yorkshire Council for Agricultural Education.—Bull. 103 :—The Making and Management of an Allotment. (39 pp.) 1916. 3*d*. [63.5(04).]

Rowles, W. F.—The Food Garden. (324 pp.) London : Headley Bros. [1916.] 6*s*. net. [63.51(02).]

Plant Diseases—

Ealand, C. A.—Insect Enemies. (223 pp.) London Grant Richards, 1916. 6*s*. net. [63.27(02), 59.16.]

Live Stock—

Trolet, G.—Le Cheval Percheron. (77 pp.) Nogent le-Rotrou . G. Fauguet, 1907. [63.61(04).]

West of Scotland Agricultural College.—Bull. 77 —Report on Experiment on the Feeding of Pigs carried out at Calderwood Estate, East Kilbride. (81–98 pp.) Glasgow, 1916. [63.64.]

Dairying and Food, General—

Winton A L Moeller J , Winton, K B —The Microscopy of Vegetable Foods with Special Reference to the Detection of Adulteration and the Diagnosis of Mixtures [2nd edition] (701 pp) New York J Wiley & Sons , London Chapman & Hall, 1916 27*s* 6d net [578 , 614 3]

Long, J —Modern Dairy Farming (131 pp) London "The Bazaar, Exchange and Mart,'' [1916] 1*s* net [63 70 (02)]

West of Scotland Agricultural College —Research Work on Hard-Pressed Cheese (10 pp) Glasgow, 1916 [63 736]

West of Scotland Agricultural College —Bull 76 —Report on the Result of Experiments on A —The Feeding of Dairy Cows on Pasture , B —The Yield and Composition of Cow's Milk during Lactation , C —The Changes in the Composition of Cheddar Cheese during the Process of Ripening (15–78 pp) Glasgow, 1916 [63 711 , 63 736]

Birds, Poultry, and Bees—

Hanson S G —Commercial Egg Farming from Practical Experiences gained over a Period of Years (62 pp) London Constable & Co [1916] 1*s* net [63 651(04)]

Jasper, Madame —The Flemish System of Poultry Rearing (174 pp) London "Country Life,' 1916 3*s* 6*d* net [63 651(04)]

Hurst J W —Poultry Farming for Beginners (175 pp) London Baillière, Tindall & Cox, 1916 3*s* 6*d* net [63 65(02)]

Phillips, E F —Bee-keeping (457 pp) New York The Macmillan Company, 1916 8*s* 6*d* net [63 81(02)]

Stanton, Blanche H —Poultry Lore for the Small-holder (80 pp) London St Catherine Press, 1916 1*s* net [63 651(04)]

Gillard, J T —Profuse Egg Production (21 pp) Hull, 1916 1*s* net [63 651(04)]

Forestry—

Gibson, H S —A Treatise on Forest Engineering (60 pp) Calcutta, 1914 9*d* [69(02)]

Webster, A D —Tree Wounds and Diseases Their Prevention and Treatment, with a Special Chapter on Fruit Trees (215 pp) London Williams & Norgate, 1916 7*s* 6*d* net [63.24–49 , 63 49–2]

Roth, F —Michigan Manual of Forestry Vol I Forest Regulation (218 pp) Ann Arbor, Michigan, published by the Author, 1914 [63 49–19 , 63 49(021)]

Roth, F —Michigan Manual of Forestry Vol. II. Forest Valuation (171 pp.) Ann Arbor, Michigan, published by the Author, 1916. [63.49 . 31 , 63.49(021).]

Webster, A. D.—British Grown Timber and Timber Trees. (164 pp.) London : Rider & Son, 1916. 5*s*. net. [63.49–198.]

Engineering—

Cleghorne, W. S. H.—Farm Buildings and Building Construction in South Africa. (325 pp.) London Longmans, Green & Co., 1916. 21*s* [69(02).]

Economics—

Haggard, Sir R.—The After-War Settlement and Employment of Ex-Service Men in the Oversea Dominions [Report to the Royal Colonial Institute] (68 pp.) London St. Catherine Press, 1916. 3*d*. net. [331 ; 325.]

Gray, H. B., and *Turner, S.*—Eclipse or Empire ? (316 pp.) London . Nisbet & Co., 1916. 2*s*. net. [33.]

Cooper, Sir W. Earnshaw.—British Industries after the War. I. The Land Industry. (52 pp.) London · Central Committee for National Patriotic Associations, 1916. 3*d*. post free. [338.1]

Surveyor's Institution —Unemployment after the War. Part II. Rural. [Report of a Special Committee of the Council.] (51 pp.) London : Surveyors' Institution, 1916. [331.]

(4919) Wt. P. 500. 6/17. J T. & S., Ltd.

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POTATO SPRAYING FOR FARMERS.

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AT the present time a considerable acreage of potatoes is being grown by farmers who have not hitherto had experience of the crop on a large scale. The potato crop is liable to be very severely damaged by the fungous disease known as "blight" or "potato disease." A serious loss of potatoes from this cause took place last year. Farmers who have made a special study of potato-growing know well that the spraying of the crop is a necessary and profitable operation, and in the great potato-growing districts of Lincolnshire and Scotland, potato-spraying takes a regular place in the ordinary routine of annual cultivations.

The growing of a full crop of potatoes is now more than ever a national duty, and there is every indication that farmers generally are anxious to adopt the practice of spraying. The objects of the present article are (1) to record the main results of the spraying experiments carried out on the farm of the South-Eastern Agricultural College, Wye; and (2) to describe for farmers the best way to make and apply those mixtures which have proved to be certain preventives of potato "blight."

Cause of Potato "Blight."—The life-history of the particular fungus (*Phytophthora infestans*) which is the cause of potato-"blight" can only, from considerations of space, be very briefly dealt with here. If, however, the farmer obtains at the outset a clear idea of the way the fungus begins its attack on the potato plant each season, the way it spreads, and how it is that spraying saves the crop, he is far more likely to remember to spray at the right time and to do the job thoroughly, than if, without understanding the facts of the case, he carries out the operation more as an act of faith.

As is well known, the " blight " is first noticeable in the form of dark-coloured spots or blotches on the leaf or stem. In the southern parts of England this usually occurs about the middle of July. The potato " haulm " thus affected becomes rapidly—if the weather is warm, wet and " muggy "—more and more diseased and blackened, and begins to emit a smell like that of bad fish, until finally it is completely destroyed, or, if the weather becomes drier, shrivels up (Figs. 1–5). When the " haulm " is thus destroyed (which may happen, with main-crop varieties, as early as the end of August), not only is all further increase of the crop prevented, so that only a small crop is obtained, but the potatoes in the ground become diseased and show discoloured blotches on the outside, and in the flesh a rusty-brown layer just under the skin (see Fig. 6).

The cause of the disease in both the " haulm " and the tuber is the same minute fungus, which under certain conditions is just visible to the naked eye. If a potato-leaf bearing patches of " blight " is examined early in the morning after a warm, " muggy " night the fungus may be seen clearly, on the under-surface of the leaf, as a greyish-white " mould " or " mildew," surrounding the edges of the diseased spot (see Fig. 2). Now, at this stage of its development the potato " blight " fungus (the spawn or *mycelium* of which is living in, and killing, the tissues of the leaf) produces myriads of very minute " seeds," called *spores*. These are borne on little branches which protrude from the under-surface of the leaf, giving the appearance there of a greyish-white " mould," as noted above. Each single *spore* is capable of infecting a healthy potato leaf, and producing a fresh centre of disease within a few hours. If no spraying has been done, and the weather conditions are suitable, the *spores* thus produced rapidly infect the surrounding plants and the disease spreads extremely rapidly. Many of the *spores* produced on the diseased " haulm " fall to the ground, and reach the growing tubers and infect them, with the result that a large proportion of the crop may prove to be " blighted."

The disease can easily be prevented by spraying the crop in time. The potato-grower plants each season a certain proportion of " seed " tubers containing some " spawn " of the fungus in them, and no practicable method is known of killing the fungus in the tuber. Such infected tubers give rise to shoots on which the first spots of " blight " for the season appear. Though the farmer cannot prevent the appearance of the " blight " fungus on a few isolated plants in the field, he can entirely prevent the spread of the *spores* from the first-formed disease-spots. If the potato-plants surrounding these early outbreaks of "blight" have been thoroughly sprayed with a copper-containing fungicide, the *spores* instead of being able to attack fresh places and infest the crop generally, are killed, and the spread of " blight " is definitely stopped for the season. The good effect of spraying the potato crop has been repeatedly demonstrated by experiments carried out in many parts of England, and particularly by the valuable work in Ireland carried out by the Irish Department of Agriculture.

Potato-Spraying Experiments at Wye College.—Spraying experiments have been carried out on the farm at Wye College for several consecutive seasons. As will be seen from the figures given below, the spraying resulted in a very substantial increase in the crop of sound tubers.

In 1908 a field of potatoes (Up-to-Date) was sprayed twice with " Bordeaux mixture " (made of copper sulphate *i.e.* " bluestone " and quicklime). A plot was left unsprayed. In this year the " blight " appeared early, and the weather conditions were such that it spread rapidly and soon blackened and destroyed the " haulm " in the unsprayed part of the field. By 31st August, the stalks in the unsprayed plot were leafless, brown, and practically dead, while the plants in the rest of the field which had been sprayed were green and vigorously growing (see Fig. 7). A careful search in July had established the fact that the " blight " fungus made its first appearance on as many plants in the sprayed part of the field as in the unsprayed part, *but owing to the " haulm " there being covered by the spray it was not able to spread as it did in the unsprayed plot.* It is in such seasons as this, when the " blight " appears early and spreads rapidly that the greatest benefit results from spraying. The figures obtained, calculated on an acreage basis, were as follows :—

	Tons	*cwt*	*qr.*
Sprayed (twice), Sound	12	5	0
„ Blighted..	1	13	1
Total crop	13	18	
Unsprayed, Sound	4	19	0
„ Blighted	4	3	1
Total crop	9	2	1

Summary of Results.—The total increase of crop per acre due to spraying twice was 4 tons 16 cwt.; the increase of sound tubers per acre was 7 tons 6 cwt.

In 1909 seven plots of ¼ acre of the Dalhousie variety, were twice sprayed with the following mixtures :—

3 plots with Bordeaux mixture,
3 plots with Burgundy mixture (copper sulphate and washing soda),
1 plot with Woburn Bordeaux Paste.
One plot was left unsprayed.

The attack of "blight" was medium in intensity. The results obtained were as follows :—

	Tons	*cwt.*	*qr.*
Bordeaux mixture (average of 3 plots), Sound ..	12	2	2
,, ,, Blighted .	0	11	1
	12	13	3
Burgundy mixture (average of 3 plots), Sound ..	12	8	2
,, ,, Blighted	0	16	1
	13	4	3
Woburn Bordeaux Paste, Sound	10	0	0
,, ,, Blighted	1	19	0
	11	19	0
Unsprayed, Sound	8	11	1
,, Blighted	1	15	3
	10	7	0

Summary of Results.—The total increase of crop per acre due to spraying twice was :—

	Tons	*cwt.*	*qr.*
Bordeaux mixture	2	6	3
Burgundy ,, ...	2	17	3
Woburn Bordeaux Paste	1	12	0
The increase of sound tubers per acre was :—			
Bordeaux mixture	3	11	1
Burgundy ,, ...	3	17	0
Woburn Bordeaux Paste	1	8	3

In 1910 the experiments were devised to test the comparative value of spraying once and spraying twice, and also of spraying "early" and spraying "late." By spraying "early" is meant the completion of the operation before any trace of "blight" has appeared on the "haulm." In the South of England, in an average season, this condition is fulfilled if the spraying (of main crop potatoes) is completed by the second

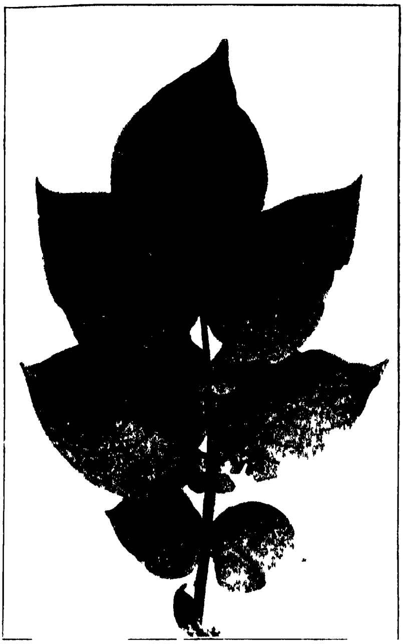

FIG 1.—First signs of attack, if spraying has already been carried out the disease will not extend further

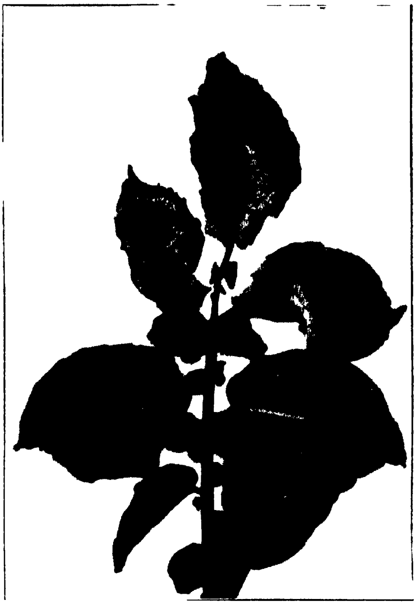

FIG 2—The three end leaflets are attacked and partly destroyed the fungus can be seen as a whitish "mould" or "mildew."

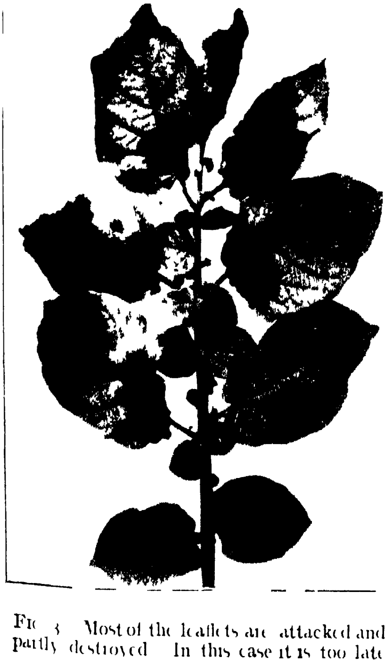

FIG 3 Most of the leaflets are attacked and partly destroyed In this case it is too late to spray.

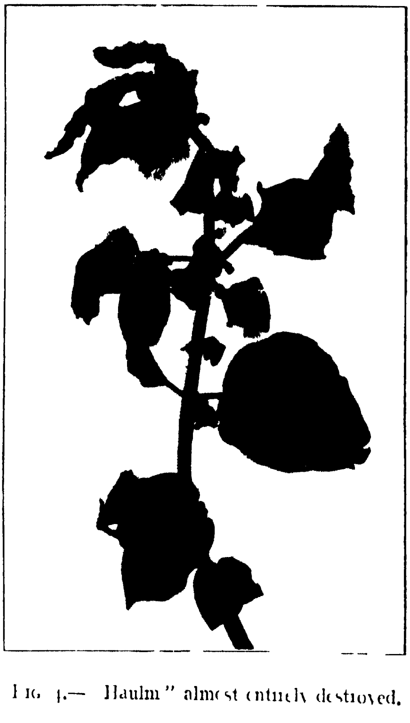

FIG 4.— "Haulm" almost entirely destroyed.

or third week of July. By spraying "late" is meant the application of the spray at a time when the "blight" has just appeared. Bordeaux mixture was used in these trials, and the plots which were duplicated, were ½ acre in extent. A severe attack of "blight" occurred, and in those plots where the disease obtained a hold, many tubers rotted in the ground. The results obtained were as follows :—

	Tons	*cwt.*	*qr.*
Sprayed once "early," Sound	9	1	1
,, ,, Blighted	0	10	0
	9	11	1
Sprayed once "late," Sound	5	10	3
,, ,, Blighted	0	3	0
	5	13	3
Sprayed twice, Sound	10	9	2
,, Blighted	0	4	1
	10	13	3
Unsprayed, Sound	5	8	3
,, Blighted	0	1	2
	5	10	1

Summary of Results—The total increase of crop per acre was :—

	Tons	*cwt.*	*qr.*
Plots sprayed once "early"	4	1	0
,, ,, "late"	0	3	2
,, twice, "early" and "late"	5	3	2
The increase of sound tubers per acre was—			
Plots sprayed once "early"	4	2	2
,, ,, "late"	0	2	0
,, twice	5	0	3

The above figures give clear proof that "late" spraying (after the "blight" has started) is of little or no use, and a waste of time and money. This same fact is shown by the photograph of these sprayed plots (see Fig. 8) in which it can be seen that at a time when the "haulm" of the crop sprayed "early" was vigorous and growing, that of the crop sprayed "late" had been destroyed by the "blight," almost to the extent shown in the unsprayed plot. The figures show also that two sprayings give a higher yield of sound tubers than one spraying. Although no weighings were made, it was clearly apparent that the percentage of ware was highest in the crop which had received two sprayings.

In 1911 a similar set of experiments was carried out, and the results obtained are of particular interest when compared with those obtained in 1910, since in 1911 no " blight " was noticed throughout the growing period. The crop in all the plots consisted of sound tubers only.

Summary of Results—

	Tons	*cwt.*	*qr.*
Plots sprayed once " early "	13	6	2
„ „ " late "	13	4	3
„ twice	13	18	0
Unsprayed	12	19	0

The total increase of crop per acre due to spraying twice with Bordeaux mixture in a season when no " blight " appeared was 19 cwt.

It was again noticeable that the percentage of ware was highest in the twice-sprayed crop. The figures obtained were as follows :—

	Twice Sprayed. *Per cent*	*Unsprayed.* *Per cent.*
Ware	86	77
Seed	11	19
Chats	3	4

In 1913 a trial was made of the method of so-called " dry spraying," which about this date began to be extensively advertised as being superior to " wet spraying." Two proprietary powders, " Herrods Dry Spray " and " Strawsonite " were used, and were thoroughly applied to the crop, at the time when the " haulm " was damp with dew, by means of one of the best distributing machines fitted with powerful bellows. Three applications at the rate of 28 lb. to the acre were given on 9th July, 25th July, and 13th August. Other plots were sprayed with Bordeaux mixture on the same dates, 120 gal. to the acre being given, using a horse-drawn potato-spraying machine (Fig. 9).

The attack of " blight " during this season was not serious. No disease appeared to any serious extent on the " haulm " of any of the plots until late in September. Early in September the " blight " was more noticeable in the " haulm " of the " dry sprayed " plots than in the wet sprayed, and it made more rapid headway. There was also more growth of " haulm " in the wet, than in the dry, sprayed plots.

Summary of Results.—The weights of the blighted tubers were not ascertained. The total crop per acre was as follows :—

		Tons	*cwt.*	*qr.*
Wet spray .	Bordeaux mixture ..	13	5	2
Dry spray :	Herrods Dry Spray ..	12	15	0
„	Strawsonite	12	14	0
Unsprayed	.. ..	11	19	2

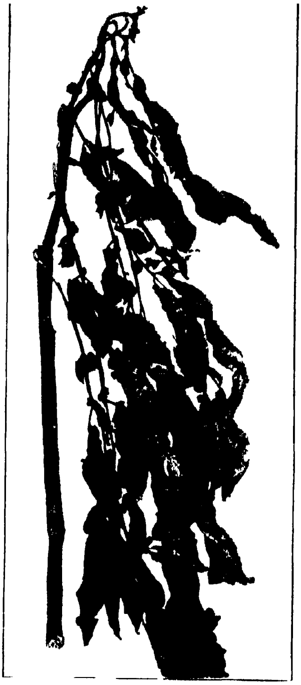

FIG. 5.—Haulm entirely destroyed.

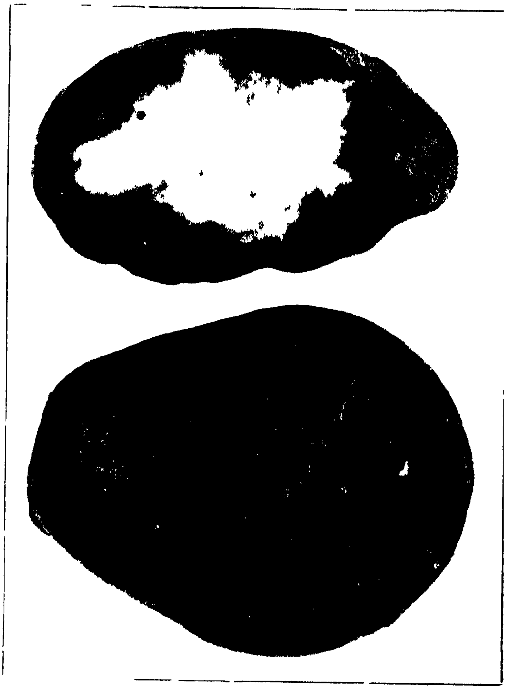

FIG. 6.—Potato tubers attacked by 'blight.'

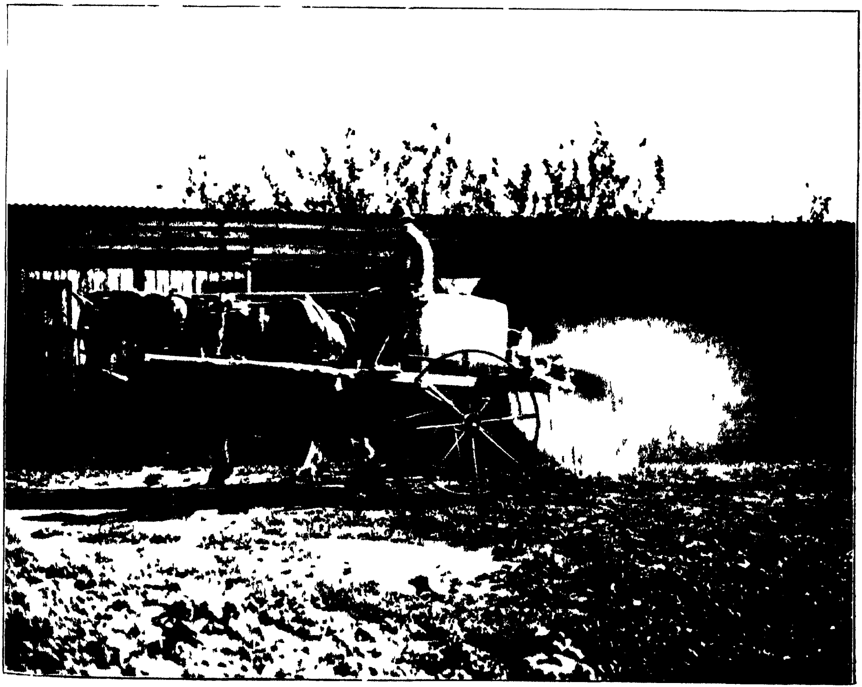

FIG. 9.—Horse drawn potato-spraying machine.

There is reason to believe that, in a season when the attacks of " blight " are severe, " dry spraying " is decidedly inferior to wet spraying. The results obtained by Dr. Pethybridge* in Ireland, in a long series of experiments conducted over many consecutive seasons, have led him to prefer " wet spraying" to " dry spraying." From the writer's own experience, he would strongly advise farmers not to trust to " dry spraying " (unless there are special difficulties in obtaining water, or the potato-fields are very hilly), but to use a home-made wet spray, either Bordeaux mixture or Burgundy mixture, either of which may be absolutely relied upon to prevent " blight."

Preparation of the Mixtures for Spraying Potatoes.—There is no difficulty for the farmer in making the mixture for potato-spraying. The operation requires nothing beyond a little careful weighing and measuring If, however, the mixture could be bought ready-made, it would probably be economical to do so, having regard to the value of the farmer's time and the shortage of labour. It cannot be too emphatically pointed out, however, that the so-called Bordeaux mixtures made by mixing various proprietary powders with water are decidedly inferior both chemically and physically to the home-made mixture; they are liable to choke up the spraying nozzle and to be distributed unequally owing to the heavier sediment, and to adhere less to the " haulm," while the home-made mixture has none of these defects.

The best mixtures for the farmer are *Bordeaux mixture* and *Burgundy mixture.* They are equally efficacious against the " blight," but where quicklime is procurable, Bordeaux mixture is to be preferred, since it has these advantages: It is cheaper; it can be made in a galvanised-iron tank; and it does not require to be tested for safety before being used, since there is no danger of any " scorching " of the " haulm " due to some slight inaccuracy in making. Detailed instructions for making the two mixtures are given below.

Bordeaux Mixture. — Stock solutions of bluestone and quicklime of a strength of 1 lb. to 1 gal. of water should first be made.

Examples.—Take (for instance) a tub to hold 40 gal.; dissolve 40 lb. of bluestone in 40 gal. of water (the bluestone will dissolve within 24 hours in cold water if tied up in sacking and suspended just below the surface of the water). Take another tub to hold 40 gal. and place in it 40 lb. of good quicklime *in lumps* (powdered air-slaked lime is quite useless);

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* *Jour, Dept. Agric. and Tech. Instr.*, Ireland, April, 1915, p. 492.

add a few pints of water to moisten the surface of all the lumps, wait for a few minutes until the lumps begin to crack and steam and crumble down; then add a little more water until a thick, creamy paste is obtained. The quicklime is now slaked; add water up to the 40 gal. mark, and a stock solution of lime of the strength of 1 lb. quicklime to 1 gal. water is obtained. The slaked lime on standing will sink to the bottom; the stock solution must, therefore, be stirred vigorously before use.

NOTE.—To economise barrels, a stock solution of bluestone of the strength of 2 lb. to 1 gal. of water may be made; it is *not* advisable, however, to make the lime stock solution stronger than prescribed above.

Formula for Bordeaux Mixture.

Bluestone	14 lb.
Quicklime..	9 „
Water	100 gal.

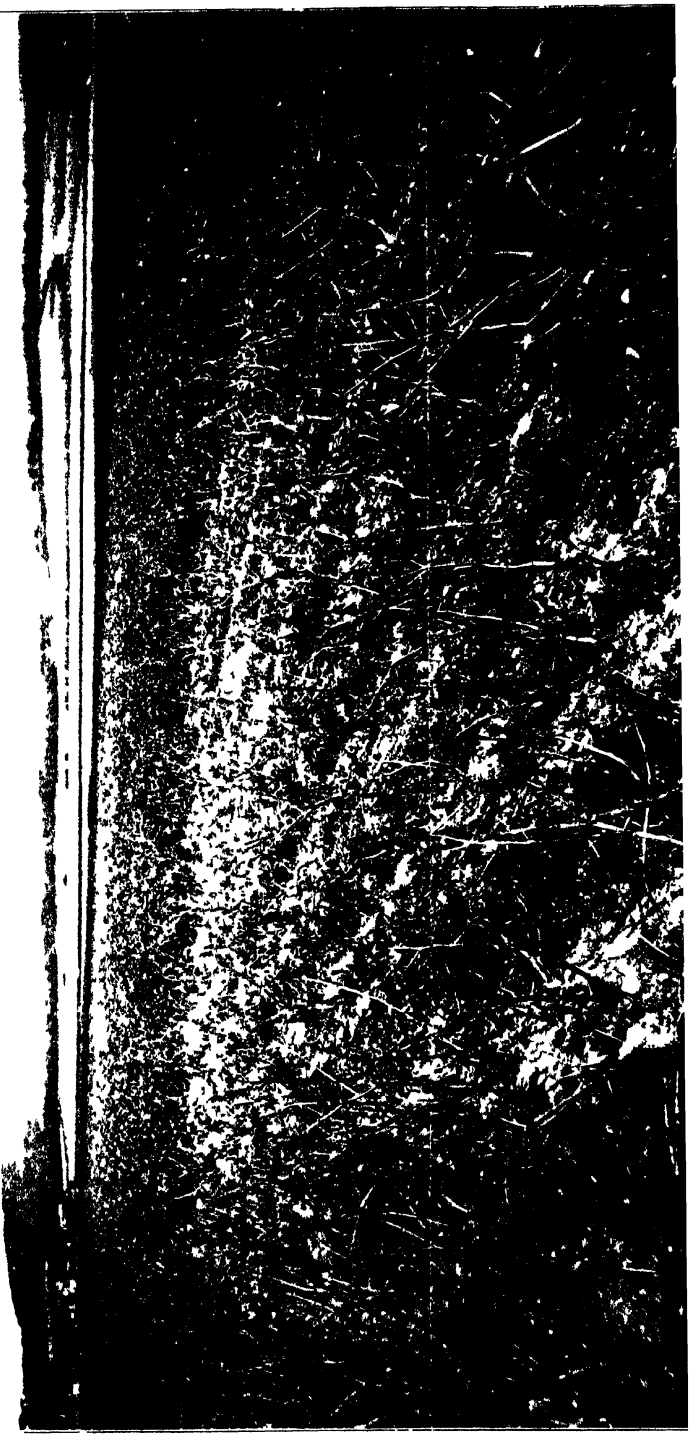
Method of Mixing.—Use the bluestone stock solution at full strength. Dilute the lime stock solution fully with water. Pour the bluestone solution into the diluted lime solution and Bordeaux mixture (of a sky-blue colour) results at once.

Example.—To make 100 gal. of Bordeaux mixture, stir thoroughly the lime stock solution; then take out 9 gal. and pour through a *coarse strainer* (rejecting all lumps) into a galvanised-iron tank or wooden vat. Add 77 gal. of water, thus obtaining 86 gal. of "milk of lime." Stir, and then pour into the midst of the lime 14 gal. of the bluestone stock solution, and Bordeaux mixture is obtained. Stir before use.

By adopting the above method of mixing, not only is a Bordeaux mixture of the best physical quality obtained, *i.e.* one in which the lightest precipitate is formed, but the mixture can be made in a galvanised-iron tank. Although the bluestone solution will affect tin and iron, if it is poured into the middle of the "milk of lime" it is immediately acted upon chemically before it can reach the sides of the galvanised-iron tank. If a galvanised-iron tank of known capacity, and tubs of stock solutions are placed on the headland of the potato field, Bordeaux mixture can be made by the hundred gallons in a very short time. The galvanised-iron tank must be washed out with water after use, or a gradual rusting will occur.

Burgundy Mixture.—Stock solutions of bluestone and washing soda should be made as follows:—

Examples.—Take (for instance) a tub to hold 40 gal.; dissolve 40 lb. of bluestone in 40 gal. of water (the bluestone



7. View on 31st August of unsprayed plot in corner of a field sprayed twice with Bordeaux mixtu
In the unsprayed plot the "haulm" was brown and practically dead in the rest of the field it was green and growing vigorously and the crop increasing (See page 267 for further details).

will dissolve within 24 hours in cold water if tied up in sacking and suspended just below the surface of the water). The stock solution will then be of the strength of 1 lb. bluestone to 1 gal. water.

Take another tub to hold 40 gal. and dissolve 80 lb. washing soda in 40 gal. water. The stock solution will then be of the strength of 2 lb. washing soda to 1 gal. of water.

Formula for Burgundy Mixture.

Bluestone	14 lb.
Washing soda	17½ „
Water	100 gal.

Method of Mixing.—Use the washing soda stock solution at full strength. Dilute the bluestone stock solution fully with water. Pour the washing soda solution into the bluestone solution, and Burgundy mixture (of a sky-blue colour) results at once.

Example.—To make 100 gal. Burgundy mixture. Measure out as carefully as possible 14 gal. of the bluestone solution into a wooden tub or vat (tin, iron, or galvanised vessels must not be used); add 77¼ gal. water. Into this diluted bluestone solution pour slowly, stirring the while, 8¾ gal. (carefully measured) of the washing soda stock solution (=17½ lb. washing soda). A chemical change takes place at once, and Burgundy mixture is formed.

The mixture must now be tested. A packet of blue litmus papers (price 1*d.*) is obtained from the chemist. If the directions given above have been followed, a piece of blue litmus paper dipped into the Burgundy mixture will not change colour and the mixture is safe to use. If, however, the blue colour changes to pink, the mixture is acid and unsafe to use (it will burn the leaves). Such a mixture can be made safe by adding and stirring in a little more of the washing soda stock solution until the blue litmus paper no longer turns pink.

NOTE.—The bluestone (copper sulphate) used may be either powdered or in crystal form, it must be of not less than 98 per cent. purity. The bluestone solution is poisonous (but not caustic to the hands) and should be kept where animals cannot drink it. While the stock solutions mentioned above can be kept safely for several months, both Bordeaux and Burgundy mixture when once made should be used within 24 hours, as afterwards a chemical change takes place, and the mixtures deteriorate. Both mixtures should be poured through a fine copper gauze strainer into the spraying machine, and then no stoppage of the nozzles occurs

Time and Method of Application of the Mixture.—In the South of England second earlies (such as British Queen and Mayfield Blossom) should be sprayed during the first week of July; main crop varieties should be sprayed in the second or third week of July, according to the weather. The writer has repeatedly seen farmers wait to put in the spraying machine until the "blight" was apparent, whereas *in every case the first spraying should be given before the disease has appeared.* Main crop varieties should be given a second spraying three weeks or a month later. Many experienced potato-growers believe that a third spraying is profitable.

The one essential in spraying potatoes is that the mixture is applied in a finely-divided "misty" spray to both the under and upper surfaces of the leaves. If this is done, and the mixture once allowed to dry on, it will be found that heavy rain will not wash off the deposit formed.

For a large acreage, the horse-drawn spraying machine is certainly to be recommended. Several different machines of the type shown in Fig. 9 are on the market. All the spraying in the experiments on the College Farm, the results of which are given above, was done with this machine. These machines, if a slow-walking horse is employed, can be adjusted to put on 120 to 140 gal. to the acre, and the maximum quantity should be aimed at. From 10 to 15 acres per day can be sprayed.

For a small acreage, excellent results are obtained with the knapsack sprayer.* Several good types are on the market. The man spraying must be instructed to keep up the pressure at the nozzle, and to place the nozzles first near the ground and spray upwards so that the under-surface of the leaf is wetted, then, holding the spraying-rod above the crop, the upper surface is sprayed. From 150 to 200 gal. to the acre should be given. If a gang of men is employed, with an extra man for mixing and for filling up the knapsacks, one man can spray about 1 acre a day.

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* See p. 367.

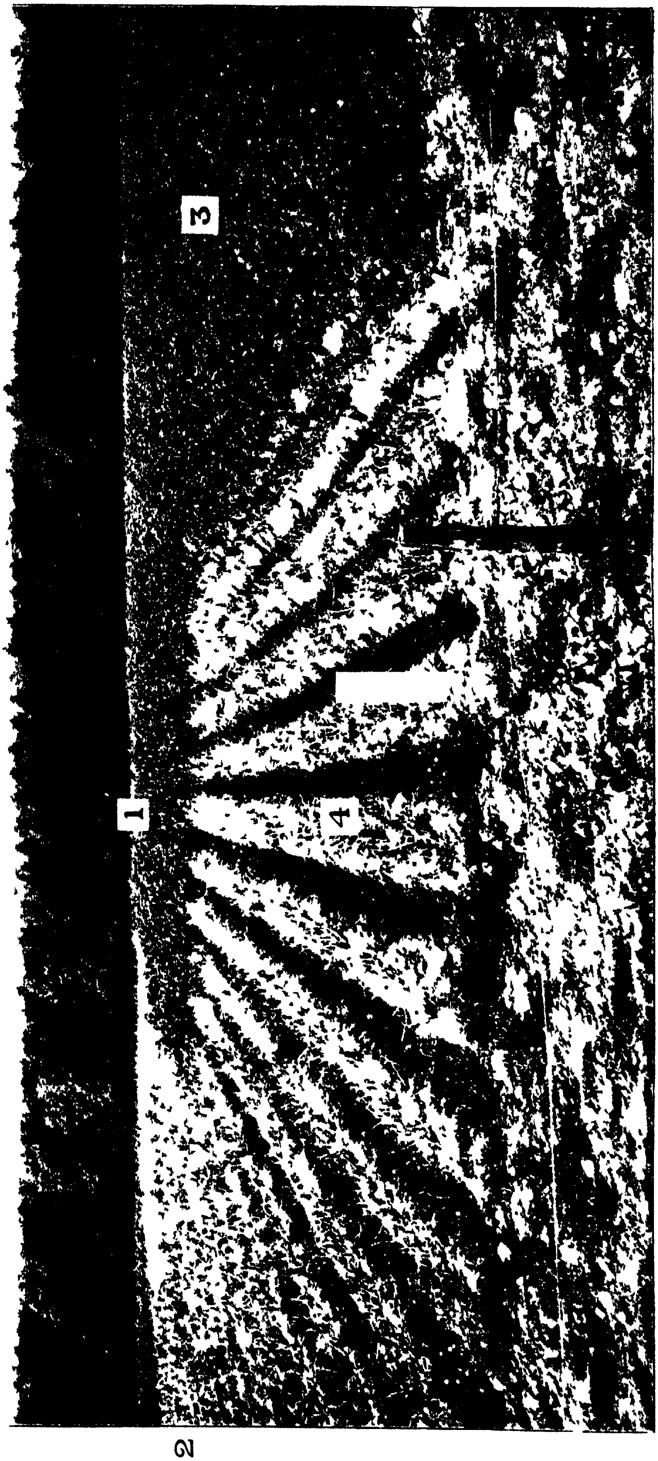

FIG. 8.—Spraying experiments with Bordeaux mixture 1910 general view 9th September Plot 1 sprayed once "early" Plot 2 (much blighted) sprayed once "late" Plot 3 sprayed twice, Plot 4 (haulm destroyed by 'blight') unsprayed (See page 209 for further details)

REPORT ON THE POSSIBILITY OF CONSERVING SURPLUS PLUMS BY DRYING.

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IN response to a request by the Board of Agriculture an enquiry was commenced at Wye College during the autumn of 1916, into the possibility of drying plums as a means of conserving the surplus supplies of this fruit which frequently occur in England. When considering this proposition it became evident to us that the main problems to be dealt with were to ascertain (*a*) whether there could be produced from Victoria plums a marketable article which would be comparable with the dried products coming on to our markets from abroad, and (*b*) whether a product of this kind can be best prepared by drying in a vacuum machine, or by the more general methods which involve the use of currents of hot air.

It was essential to keep in mind the fact that the successful drying of plums in this country is mainly dependent upon a knowledge of how to deal with a glut of fruit occurring over a short period of the year. From this point of view, rapid drying is of paramount importance, more especially for the purpose of evaporating the fruit down to such a degree of dryness that it may be put aside for a time while fresh material is being dealt with.

In reviewing the literature dealing with fruit and vegetable drying, a good deal is to be found relating to plum-drying. The methods employed may be classified broadly as follows :—

(*a*) Sun-drying.
(*b*) Evaporation by artificial heat.
(*c*) Evaporation and subsequent treatment
(*d*) Pruning, or slow stewing followed by evaporation.

With regard to the first of these it is obvious that in the autumn our climate is unsuitable for drying fruit by heat from the sun.

Evaporation by artificial heat, without further treatment, has frequently been advocated in this country as a means of conserving both fruit and vegetables, and a good deal of detail is on record relating to drying on this plan by means of currents of hot air and by heating in evacuated chambers. By far the greater amount of attention in the past, however, has been given to the former of these two methods of artificially drying fruit. With regard to the second method, the information available amounts to little more than descriptions of machinery, the practical details of the process being only briefly referred to.

One of the difficulties encountered when developing the method of simple evaporation by artificial heat is that the product obtained differs somewhat widely in colour, texture and flavour from the usual article on the market, and it appears that under normal circumstances of trade no market can be developed for dried plums of this kind in competition with the superior article coming from abroad. These foreign supplies of dried plums are mostly obtained by submitting the ordinarily dried product to some subsequent process which brings about a change in the colour and flavour of the fruit. No details of the processes for effecting these changes are to be found, probably owing to a close secrecy maintained on the part of the manufacturers, and it has been necessary to devote a good deal of attention to this part of the problem.

Far more information is available with regard to the pruning of plums than to their evaporation but, when considered as a method of dealing rapidly with large quantities of fruit during a short time, it is obvious that this method of preserving suffers from the disadvantage that considerable time is necessary for carrying out the early stages of the process. This delay in producing a product capable of being handled, practically precludes the adoption of the usual process of pruning for the purpose in view.

These considerations have prompted us to proceed along the following lines of enquiry :—

(1) A study of the rapid drying of the harvested plums in order to reduce them to a condition in which they will keep without deterioration until the plum harvest is over.

(2) Working out the conditions best suited for drying plums (*a*) by means of currents of hot air (hot air machines), and (*b*) by heating them under reduced pressure (vacuum machines).

(3) Comparison of Victoria plums with other varieties used for drying to discover whether there is any inherent quality of the Victoria plum which would prevent the success of a process which has been found suitable in the case of other varieties.

(4) The elaboration of some method for converting the dried Victoria plums into an article likely to meet the demand of the market.

Preliminary Treatment.—When considering the question of rapidly drying vegetable material, it seemed obvious that the nature of the moisture retaining surface of the substance to be dried will influence largely the rate at which evaporation can take place. From this point of view, it appeared that fully ripe fruit would dry more rapidly than unripe or partially ripe fruit; indeed, any preliminary treatment which will render the outer skin more pervious should assist in hastening the drying of the fruit. One finds several writers who advocate submitting the fruit to a certain preliminary treatment which, it is claimed, changes the nature of the outer skin, so that the plums lose moisture more rapidly than when drying is carried out without such treatment.

The methods usually recommended for effecting this change are (1) Dipping in hot solutions, (2) Steaming for a few minutes, and (3) Pricking the skin.

Comparative trials of these preliminary operations have been made and other means have been tried for bringing about the same result.

(1) *Dipping.*—This consists of using a hot solution of 1 or 2 per cent. carbonate of soda or potash, in which the plums are dipped for various periods ranging from one to six minutes. It has been claimed for this process that in addition to hastening the subsequent drying of the fruit, it renders the skin less easily broken during the earlier stages of evaporation and so prevents the plums from splitting. Our experience has been that little or no advantage is derived from this practice as the plums are still very easily damaged and no appreciable hastening of the drying could be established; in fact the conclusion come to is that this dipping may actually retard the drying of the plums without giving any compensating advantage when handling them.

As an example of our experience it may be mentioned that when partially ripe Czar plums were submitted to this dipping process and then dried, the product obtained presented a dull appearance compared with that obtained when no such treatment was adopted, and no hastening of the drying process was observed. Indeed, in the case of ripe Victoria plums, the dipped fruit suffered greatly when handled and the drying process was retarded, as may be seen from the following data: 15 lb. Victorias dipped in a hot 1 per cent. solution of carbonate of soda, and then evaporated for 12 hours between 70° and 80° C., weighed 4 lb. 8 oz.; and after 18 hours 1 lb. 14 oz. The same quantity of the same sample of plums, without this treatment, after drying under the same conditions for 12 hours, weighed 2 lb. 11 oz., and after 16 hours their weight was 1 lb. 9 oz.

(2) *Steaming.*—Experiments to test the value of this process were carried out with several varieties of plums, *i.e.* Belle de Louvain, Yellow Magnum, Monarch and Victoria, all of which were used at different stages of ripeness as it was thought probable that the value of such treatment might vary with the degree of ripeness of the fruit. Our experience showed this to be so, preliminary steaming exercising a maximum beneficial effect when the fruit is not fully ripe.* As typical of the evidence obtained the examples given in Table I. may be cited. Some difficulty was experienced in getting uniform steaming throughout the bulk of plums; those nearest the steam inlet becoming over-steamed and damaged before those occupying the centre of the mass were affected at all. It is probable, however, that this difficulty could be largely overcome in practice.

TABLE I.—*The Influence of Steaming on the Subsequent Drying of Plums.*

Material.	Condition of Drying.	Weight after Drying.	
		Steamed.	Control.
		lb. oz.	lb. oz.
Monarch—			
Unripe, 15 lb.	12 h. at 70°–80° C.	5 6	5 7½
	18 h. ,,	2 11	2 12
Yellow Magnum—			
Mod. ripe, 15 lb. ..	12 h. ,,	4 14	5 2½
	18 h. ,,	2 5	2 8
Victoria—			
Mod. ripe, 15 lb. ..	6 h. ,,	8 10	9 6
	12 h. ,,	3 3	4 5
	18 h. ,,	1 14	1 10
Victoria—			
Fully ripe, 15 lb. ..	12 h. ,,	4 4	2 11
	18 h. ,,	1 13	1 9

(3) *Pricking.*—Experiments were carried out on similar lines with pricked and non-pricked plums. The main difference observed with the pricked plums was that a considerable amount of fruit juice was lost during drying, and after evaporation the plums presented a more glossy appearance and were rather sticky.

(4) *Other Methods.*—These collective results indicated the desirability of experimenting with other methods of rendering he skin of the fruit more pervious to water vapour, as it is

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* See footnote on p. 280.

obvious that without some such treatment the operation is a very long one. With this object in view various substances, such as benzene, ether and chloroform, were used, the plums being submitted to the vapour of these substances and preliminary observations being made, on the amount of fluid which drained from them after such treatment.

The results of these laboratory trials made it evident that these vapours had the desired effect, particularly chloroform, which showed promise of being a useful medium for quickening the drying process. Accordingly, trials were made by submitting weighed quantities of plums to the vapour of chloroform in a closed vessel for 30 minutes prior to drying them (Table II.). This treatment caused the colour of light plums, such as Victorias, to become dull and darker, but no other change was obvious. The chloroformed fruit was far less liable to suffer damage by subsequent handling than when the fruit had been steamed, and the effect produced by this preliminary treatment was found to be far more uniform throughout the mass of plums than when steaming was adopted.

TABLE II.—*The Influence of Chloroform on the Subsequent Drying of Plums.*

Material.	Condition of Drying.	Weight after Drying.	
		Chloroformed.	Control.
Victoria, 10 lb.—		lb. oz.	lb. oz.
Very unripe	12 h at 70°–80° C.	1 6	3 8
	18 h. ,,	—	1 14
Unripe	12 h. ,,	2 0	3 4
	18 h ,,	—	1 12
Mod. ripe	6 h. ,,	4 12	6 4
	12 h. ,,	2 3	2 14
	18 h. ,,	1 2	1 11
Ripe	12 h. ,,	1 14	1 12½
	18 h. ,,	1 0	1 8
Very ripe	8 h. ,,	3 6	3 6
	12 h. ,,	1 8½	1 6½
Pond's Seedling—			
Ripe, 10 lb.	18 h. ,,	1 8	1 7

From these results it is seen that chloroform shortens the drying process by approximately 6 hours in the case of the less ripe fruit; also, that the rapidity of the drying process is largely dependent upon the degree of ripeness of the fruit to be dried. It is clear also that the influence exercised by the chloroform practically ceases when the fruit dealt with is completely ripe.* Even with unripe fruit, in which case chloroform produces its maximum effect, the more rapid rate of drying brought about by this preliminary treatment is not maintained throughout the entire drying operation. A steady falling off is noticed, so that after about 18 hours the degree of dryness of the treated and non-treated fruit is approximately the same. The degree of dryness obtained at this point, however, is greater than that required for the preservation of the fruit, so that the benefit of this treatment is by no means lost. The main advantage is derived from the fact that a mixed sample of plums, comprising fruit at various stages of ripeness such as is usually sent to market, when submitted to the vapour of chloroform for 30 minutes, dries afterwards as though all the plums were in the same condition, namely, fully ripe. This means that at the conclusion of the drying period a far more uniform product is obtained and the necessity is removed for picking out from the bulk a considerable number of plums which have dried at a much slower rate owing to their having been in a less ripe condition to begin with. The development of this method is held to be of considerable importance as affecting the possibility of drying plums commercially.

In order to make the work relating to the preliminary treatment of the plums as complete as possible, trials were made of a modification of the method employed in the preparation of the Agen plums—a method which practically amounts to slowly stewing the plums in their own vapour. For this purpose the plums were heated in a closed chamber at a temperature of 45°–60° C. for about 6 hours. Then, after 12 hours' exposure to the air, they were again similarly heated between 60°–70° for about 6 hours and then evaporated in the usual manner.

Owing to the slow rate of drying and the low temperature at which it takes place it is claimed for this method that the skin of the fruit does not become cracked and certain chemical changes occur in the substance of the plum which do not take place at higher temperatures, so that the plum does not become soft again after the final drying process is completed.

The flesh of the plum was observed to be changed to a brownish colour by this process and the general appearance of the product resembled, somewhat closely, that of the familiar prune.

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* As in the case of "dipping" and "steaming," the drying of ripe fruit appears to be retarded somewhat by previous subjection to chloroform.

The Drying Process.—Two types of machines were used during the investigation, namely a small "Gnom" machine and a vacuum plant which had been adapted to serve for experimental purposes in connection with vegetable drying. In the case of the "Gnom" machine, drying is brought about by means of a current of warm air which passes, by its natural draught, through tiers of trays containing the material to be dried. In the case of the vacuum plant, the material to be dried is maintained at a uniform temperature in a heated chamber which is evacuated down to a pressure of about 5 to 10 in. of mercury.

Although it cannot be said that these machines represent the best kind of hot air or vacuum drying appliance, each machine was generally suitable from the point of view of the enquiry. In the case of the "Gnom" machine the material can be easily manipulated and kept under observation without interrupting the drying process; whereas, in the case of the vacuum plant, this is not possible without breaking the vacuum and opening the apparatus which causes loss of heat and much delay. There is a considerable waste of heated air from the top of the "Gnom" machine and the flue chimney being outside the apparatus, no use is made of the heat of the flue gases; so that the coal consumed by this machine is unduly high. Perhaps a more serious drawback is the deposition of moisture from the humid hot air as it travels upwards and cools. In consequence of this, the drying of the fruit situated in the upper trays is retarded very considerably, and unless very carefully controlled the partially dried fruit on these trays may actually take up moisture again and become wet. With this machine considerable experience is necessary to keep the temperatures approximately constant, and it has been found that the air currents are not uniform over the different parts of the drying area of the trays. All this means that careful manipulation and constant attention is necessary throughout the process of drying.

In the case of the vacuum machine efforts were made to maintain a uniform temperature in all parts of the drying chamber so that the fruit on all the trays should be dried approximately to the same extent during the same time, regardless of the position it might occupy in the machine. With the particular machine at our disposal this proved impossible to achieve, and it became necessary, therefore, to stop the drying process in order to sort over the fruit. As this could not be done economically at short intervals, it generally happened that a considerable number of the plums were overdried or insufficiently dry at a time when the bulk of the material had reached the proper degree of desiccation. Once the doors are closed, the fruit receives no further attention until they are reopened and, as in practice the intervals between two successive openings would not be less than six hours, one experienced man would have an opportunity of attending to three or four similar machines.

Temperatures at which Drying was conducted.—Experiments carried out with the "Gnom" machine showed that the highest temperature at which plums could be dried satisfactorily was between 80° and 90° C. When the temperature rose above 90° C. it was found that scorching was liable to take place so that drying was practically limited to a temperature below 85° C.

In view of the long periods during which no observations of the plums could be made when using the vacuum machine, the temperature was not allowed to rise above 80° C. Throughout the course of these trials the temperature was always maintained between 70° and 80° C.

Drying Period.—When operating with the "Gnom" machine and when the plums had not been subjected to any preliminary treatment, the time necessary to attain to a proper degree of dryness was about 25 hours,* whereas, in the case of the vacuum machine, the same degree of dryness was reached after about 18 hours.

Slight differences in the time and temperature necessary to dry different varieties of plums have been recorded by previous workers and have been observed by us, but our experience shows that except where there is a marked difference in the size of the different kinds of plums dealt with, variations in their stages of ripeness is the main factor causing differences in the number of hours necessary for their proper drying. Thus, for example, unripe Victorias compared with ripe Victorias took 8 hours longer to attain to the same degree of dryness, whereas only a difference of an hour or two was noticed in the case of different varieties of plums of the same size and apparently the same degree of ripeness. From results of this kind it seems clearly desirable to grade the fruit according to size and ripeness prior to drying, unless the preliminary treatment with chloroform is to be carried out, in which case it is only necessary to grade according to size.

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* It must be observed that this time—about 25 hours—is somewhat in excess of that recorded in the *Journal of the Royal Agricultural Society* when using the "Invicta" type of machine. This does not necessarily indicate any actual difference, because in our trials the plums used were such as are sent commercially to market and may have been less ripe than those used in the trials referred to.

It seems clear from our trials that ripe Victoria plums containing 84 per cent. of moisture must be dried down to approximately one-fifth of their original weight in order to be in a fit state for temporary storage or for subsequent treatment. Although not completely dried at this stage—containing approximately 20 per cent. of moisture[*]—they appear to keep indefinitely if properly exposed to the air before being stored. If, however, they are put away loosely packed in closed receptacles they soon " sweat " and it is not long before mould develops on such plums.

Intermittent drying was generally adopted in these experiments although several unbroken trials were carried out for the purpose of making a comparison. No advantage was derived from continuing the drying uninterruptedly for 18 hours, so, for reasons of convenience, the drying periods were seldom continued for more than 12 hours without a break. Generally, the drying was interrupted every six hours for the purpose of examining the fruit on the trays.

Nature of the Dried Product.—When no preliminary treatment was adopted and the plums were simply dried down to approximately one-fifth of their original weight in the manner described, the product, in the case of Victoria plums, was somewhat disappointing. The skin of these dried plums was tough and their general appearance was dull and unattractive; there was very little " flesh " on the plums and their taste was unpleasantly acid. When Victoria plums were dried for 12 hours only and then bottled, their colour became paler after keeping and considerable quantities of liquid exuded from them. They were quite unfit for storage purposes or domestic use. After drying for 18 hours, the colour of the product from the vacuum machine was darker and the general appearance better than the product obtained from the " Gnom " machine. In every case the plums dried for 18 hours were found to keep quite well when stored and, even when loosely packed in closed jars, they remained perfectly sound, the only change observed being the slow appearance of fruit sugar on the surface of the dried plums. No difference was observed in the appearance of material dried for 18 as compared to 22 hours, although the interesting fact was revealed that when dried for the longer period no crystallisation of sugar took place on the surface of the plums, even after having been stored for a considerable time (3 months).

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[*] In view of considerable variations in the size of the fruit-stone noticed with different samples of plums this degree of dryness is perhaps better defined with reference to the material without the stone—that is to say, the flesh of the fruit—rather than to the whole dried fruit. We have found with suitably dried samples that such (stoned) material contained approximately 24 per cent. of moisture.

When Victoria plums had been subjected to a semi-pruning or "stewing" process prior to drying, the colour of the skin of the plums coming from the "Gnom" machine was light and inferior to that of untreated plums; but, in the case of such material dried in the vacuum machine, the colour was better, being a dark reddish-brown. In both cases this preliminary treatment caused the flesh of the plums to become darker and, although still very acid, the texture and flavour of the dried product somewhat resembled those of the prune. In the case of Victoria plums which had been steamed previous to drying, it was found that in nearly every case the plums split during the early stages of the drying process, thus exposing the stone, and a good deal of the substance of the plum was lost. Dipping in alkaline solutions induced bad colour and texture in all varieties tried, and no lessening of the number of plums which split during drying was noticed. Very little advantage was found to result from pricking the plums prior to drying them. The dried plums were a little more glossy in appearance but this small advantage was counterbalanced by the sticky nature of their surface.

After Victoria plums had been submitted to the vapour of chloroform for 30 minutes and then dried for 12 hours the product obtained was dark in colour and of good appearance, being much better than when this treatment was omitted. With regard to quality and texture, it was comparable with the material obtained by drying untreated plums for 18 to 22 hours under similar conditions, the only difference being that after three months' confinement in closed jars, a greater proportion of sugar was deposited on the surface of the plums which had been previously chloroformed. These observations apply equally to other varieties of plums which were tried, namely, Yellow Magnum and Pond's Seedling, but in these cases, the appearance of sugar on the surface of the plums was not observed. In the case of Louvains, which are larger and darker than Victorias, a superior product was obtained. The dried plums were far more fleshy and still retained the original bloom of the fresh fruit. Dried Louvain plums were superior in size, taste and appearance to any other variety employed. A quantity of Louvain plums was dipped into a strong syrup of cane sugar a short time before the drying was completed and then the evaporation was continued. This caused them to assume rather an attractive glossy appearance, but the sugar showed no sign of becoming crystallised and the dried fruit remained sticky, even after keeping for a considerable time.

The more fleshy black plums, Monarch, Black Diamond and Czar, all gave a better dried product than the Victoria. This was due to the character of the plum. Of those varieties the Monarch was the best from the point of view of external appearance. In this case also, the original bloom of the fruit was preserved to some extent and except for taste the product was equal to that obtained from the Louvain plum. With this variety, as with Black Diamond, sugar was not found to crystallise on the surface of the dried plums when stored, whereas, in the case of Czar plums, this external deposition of sugar was observed.

It cannot be said that the flavour of the dried plums we have prepared from the various varieties referred to is very agreeable. This is largely due to the inherent character of the plums dried, and also to the fact that they have been used before enough sugar has been stored in the fresh fruit to make the dried product sufficiently sweet for the ordinary palate. Although their texture is somewhat hard and their skin tough, all the dried plums prepared by the methods described have given excellent results when cooked.

Subsequent Treatment.—With the exception of the plums which were partially stewed preparatory to drying them, the dried plums obtained from all the varieties used were hard and leathery. It appeared that some kind of cooking process was necessary to convert them into a more attractive commodity. Having in mind the changes which were observed when these dried plums were stewed and from certain vague references found in the literature in connection with the preparation of French and California plums, trials were made to ascertain whether there was sufficient water left in the dried plums to effect their partial cooking when they were heated in closed vessels to 120° C. for a few hours. It was found, however, that the moisture present was insufficient to prevent the plums from becoming burnt, but the general effect of this treatment was in the direction desired. After only two hours heating in an autoclave to 120° C. the product, although somewhat burnt, was improved in colour and general appearance, while the texture of the finished plums was superior to the untreated dried plums. Even in the case of Victoria plums their colour after this treatment resembled that of the popular prune.

Similar experiments at 105° C. carried out for a period of two hours led to similar results and the degree of scorching was reduced. When repeated with the addition of a small quantity of water to the plums and heated at a slightly lower temperature, namely 100° C. for three hours, the desired change was effected, although, in the case of the Victoria plums, a slight scorching had resulted which spoilt their flavour. Heating in an autoclave was then abandoned and the last mentioned experiment was repeated several times with Victoria plums packed tightly in closed vessels and heated in an atmosphere of steam at 97° C. for varying periods of time. It was then found that with Victoria plums, as with others, a good product was obtained after heating them for about four hours at 97° C. In these subsequent heating trials it was observed that caramelisation takes place even at this lower temperature unless a definite minimum amount of moisture is present. Unfortunately the impossibility of procuring further supplies of Victoria plums prevented this point from being worked out more fully.

In view of the lack of sweetness of the dried plums prepared and the toughness of their skins, attempts were made to employ a combined stewing and sweetening process by cooking the dried plums in a very highly concentrated solution of cane sugar, the point of view being that since the skin of the plum had been " killed " by the drying process, the sugar might be made to permeate the substance of the plum. The treatment employed seemed to have the desired effect as far as sweetening was concerned but it was found inpracticable to deal satisfactorily with the final sticky product.

The application of glycerine to the hard surface of the dried plums was not found to do more than improve their outward appearance and to render them more supple; the toughness of their skins was not appreciably reduced and the increased sweetness due to the glycerine applied was too slight to be of material advantage. Owing to the improved appearance after burnishing with very small quantities of glycerine it is likely that a finishing off process of this kind would prove to be of some commercial advantage.

Conclusions.—The best temperature at which to dry Victoria plums, as indeed all varieties of large plums, whether in a hot air or a vacuum machine, is from 70° to 80° C.

The time required for proper drying varies with the size and degree of ripeness of the fruit and differs according to the nature of any preliminary treatment to which the plums may have been submitted. Using moderately large plums, without any preliminary treatment, and working with the " Gnom " machine, the drying period was found to be approximately 25 hours as compared with 18 hours when dried by the vacuum process. With a hot air apparatus of better construction than the " Gnom," this difference in time of drying might be reduced.

Continuous evaporation for periods shorter than those indicated above fails to give a product sufficiently dry to admit of its temporary storage while fresh material is being dealt with.

With the exception of " dipping," all the methods of treatment prior to drying which have been followed, namely. steaming, pricking and exposure to chloroform vapour, tend to shorten the necessary drying period. The chloroform treatment has brought about the maximum reduction of time, *i.e.* 6 hours, or 33 per cent. in the case of Victoria plums.

Although the preliminary treatments mentioned exercise a marked influence on the time necessary for drying, the ultimate texture of the dried plum is but little improved so that a treatment subsequent to drying is necessary. The best results have been obtained by heating the dried plums in a limited quantity of steam in closed vessels for a few hours.

The exact conditions under which these changes are best carried out have not yet been definitely established and in this direction further work is necessary.

In conclusion we desire to acknowledge the very great assistance given by Miss Marriott during the early part of this work.

INVESTIGATIONS AND EXPERIMENTAL WORK CARRIED ON IN CHERRY ORCHARDS IN KENT DURING THE MONTHS OF APRIL AND MAY, 1915-1916.

G. P. BERRY,

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DURING the period in which cherries were in bloom visits were paid to orchards in the Faversham, Sittingbourne, Rainham and Selling districts of Kent.

The district in which the towns and villages just named are situated has long been famous for cherry growing, and, according to local report, this vale is the home of the cherry in England.

There are certainly at present in this district some of the finest cherry orchards in the country, while the remains of old orchards indicate that cherries have grown and luxuriated for several generations.

The soil along this valley shows some variation, but the bulk of it might be classed as a stiff clayey loam on a chalky clay, or in some instances on a more or less pure chalk. The health and vigour of the trees as compared with other parts of the county and other counties would appear to indicate that the soil already described constitutes a typical cherry soil.

Pollination Difficulties.—On systematically examining numbers of orchards the fact becomes apparent that the cherry grower has, perhaps, as many pollination difficulties to face as the apple, plum and pear grower.

The modern cherry grower has been trying for years to reduce the number of varieties, and has in many cases departed from the old system of a general mixture and been more inclined to plant in blocks. This system has to some extent accentuated the pollination difficulties.

Although in this cherry district there still remain many old local varieties, the general tendency has been to eliminate the old and introduce the more modern. This being the case, the varieties now grown are pretty well defined and similar all over the area which may be termed the Faversham district. The varieties giving the most trouble are Early Rivers, Turk, Elton, Amber Bigarreau (syn. Kentish Bigarreau), and Waterloo.

It was decided in the first place to watch these five varieties and make careful notes on the sites where any of them might be found to crop well; also to note any varieties intermixed with them and in proximity to them, and to observe their respective flowering periods.

As a guide in this direction several lists were already in hand from large growers, giving the flowering periods in their particular districts.

A considerable amount of information has been obtained, and if this could be backed up by careful and more extensive investigation in the future, data of practical utility to the cherry grower would in all probability be obtained.

All the varieties noted as giving trouble are most desirable from a commercial point of view: they keep up a succession, and when well grown they meet a ready sale. Unfortunately, one of the varieties (Elton) would appear to be of weak constitution, or, rather, is losing its former robustness, and shows a tendency to die back and canker in many districts.

Blooming Periods.—Among the five varieties already named, Early Rivers, Turk and Elton are the earliest bloomers, and this is also true with regard to their relation to all the principal commercial varieties which are grown in the county.

There are one or two other varieties which flower very early, *i.e.* Adam's Crown, Knight's Black, Caroon's, Victoria Black, etc. It would appear that some of these latter varieties are factors in the setting of Early Rivers on some plantations. From an average of the records of the blooming periods of cherries which have been obtained from various growers over several seasons, it would appear that the blooming period of cherries may be put down at from 21 to 25 days. This is only approximate, as the seasonal variations are great. In a dry, hot season the periods will be shorter, and in cold, wet sunless seasons longer. The period over which the trees may be said to be in full bloom is very much shorter, 10 to 12 days being about the limit.

Some varieties come into bloom very gradually, others more suddenly, and the same may be said of the period during which the petals fall: some have a succession of late bloom, others are over at once. Varieties which keep opening a late crop of bloom, after the bulk of the main bloom has been shed, often set a partial and sometimes a good crop in unfavourable seasons, after the main crop of bloom has been destroyed by frost.

Frost.—During the observations, indications were incidentally found which seemed to point to the fact that certain varieties have more delicate blossom than others, and are, therefore, more liable to damage by frost. During the blossoming period of 1915 there were two or three nights when the thermometer registered three and four degrees of frost.

The effects of this frost were clearly observed on Elton and Turk. A large number of orchards was visited during the blossoming season and in every instance, where the blooms of these two varieties had been open early, they were considerably damaged by frost. This was corroborated again in 1916, when the same and other orchards were visited.

Elton seemed to have suffered most severely. Large numbers of the bloom trusses on the upper side of the twigs were quite brown, despite the fact that blossoms of this variety are pendulous and supported by a long and very slender strig (strig is the term used amongst growers for fruit stalk).

In all the low-lying orchards it appeared that quite half the bloom of this variety had been destroyed, the stigmas as well as the petals being affected, although the anthers did not seem to have suffered in the same way, and apparently were dehiscing normally. In the case of the Turks, the same conditions were observable to a lesser extent. The blossoms of this variety have a short stout strig, which does not protrude them beyond the foliage, and they have, therefore, probably more protection.

In the case of Early Rivers, the blossoms are strong and large, and the petals thick in texture. Indications of damage from frost were almost entirely absent, although the opened blooms had passed through the same climatic conditions as Elton and Turk.

This evidence, combined with other of a similar nature from other parts of the country, has led the writer to assume that the poor returns often obtained from Elton and Turk may be due in a great measure to their susceptibility to damage from frost. On the higher orchards Elton and Turk seemed to be cropping better and had suffered less from frost. This was probably not due to the fact that the frost was more severe in the valleys, but to the fact that the blooming periods in the higher orchards were later.

Soils.—It was also observed that on heavy loams overlying clay, all varieties were several days later in coming into bloom than the same varieties on lighter loams with more chalky sub-soils.

This was particularly noticeable on the plantations of Mr. W. W. Berry, where cherries are well grown. At Gushmere Court, Selling, Early Rivers was more than a week ahead of the same variety at Newton, and the distance apart is only a matter of a few miles. The Newton plantations are considerably higher, and that will also have an effect. The difference in some cases, however, was to be seen on the same plantation where the soil varied.

On the heavy soils all varieties come into bloom more uniformly, and the distinction in the times of blooming between early and late varieties is not so definitely marked Climatic conditions have also something to do with this : for instance, in 1915 there was a tendency for all varieties to be in bloom together for a longer period than usual. The brilliant weather seemed to bring on the late varieties with a rush and there was thus more overlapping than usual. Last season, 1916, this was not so marked.

Pollination Problems.—Early Rivers is, generally speaking, the first variety marketable. It is a fine, large, dark-fleshed cherry of good appearance, and owing to its earliness and other good qualities, always commands a high price on the market, and if picked a little sharp it carries well. Many growers complain that over a long run of seasons they never have had a full crop, and oftener only a quarter crop.

At Gushmere Court, Selling, several trees of this variety have a reputation of cropping well and constantly.

At this centre it was brought to notice that there is another variety, known in Kent as Baumann's May, which is very similar to Early Rivers. So great is the similarity that this variety is sent to market along with Early Rivers, and is never detected. It commands the same price, and its time of ripening is identical with Early Rivers. This variety (Baumann's May) is planted along with the Early Rivers trees at Gushmere Court. The question as to the possibility of its being a polliniser for Early Rivers at once arose.

Cross between Baumann's May and Early Rivers.—With a view to determining whether the pollen of Baumann's May would set Early Rivers, it was desired to carry out some experiments on the spot. Mr. W. W. Berry at once concurred, and kindly afforded every possible facility. In this work the writer was very ably assisted by a sub-inspector, Mr. Cousins, who went round and examined the crosses and took careful notes of the results obtained.

The writer accordingly set about making crosses between Baumann's May and Early Rivers. Two trusses of Early Rivers were selected on separate trees. All open blossoms were cut away. The unopened blossoms which were on the point of opening were gently assisted to do so. Three of the strongest blossoms were then selected, and the anthers which had not dehisced were carefully removed. All the other unopened blossoms were now cut away and pollen was conveyed from blossoms of Baumann's May by means of a camel's hair brush and placed on the stigmas of the blossoms of Early Rivers, which had been prepared for its reception. The truss was then carefully surrounded with a muslin bag and labelled. A note was now made as to the cross, its position on the tree, and the position of the tree in the plantation. The brushes used for conveying the pollen were carefully sterilised in absolute spirit after each operation.

From these crosses it was found that the pollen of Baumann's May did set Early Rivers. Every blossom of the latter variety to which pollen was brought, set and matured fruit.*

At Mr. Thomas' orchard, Buckland, near Sittingbourne, Early Rivers and Baumann's May are again in mixture, and here both varieties always crop well and have done so for a number of years.

At another orchard in the district, this combination does not seem to be so satisfactory, but in this case the trees are young, making strong growth, and not bearing an abundance of blossom. Probably they will come into fruiting all right as soon as the growth is steadied.

There are other centres where Baumann's May exists, and these should be carefully watched.

On close examination Baumann's May presents characteristics by which, when in leaf, a careful observer can readily distinguish it from Early Rivers. The habit of Baumann's May is slightly more spreading and the young growths and leaves are more pendulous than Early Rivers. The whole habit of the tree indicates that it is a rather stronger-growing variety than Early Rivers. In other respects the two varieties are very similar and the fruits when ripe are identical, but in the earlier stages of ripening a mottling appears which seems to indicate traces of the Bigarreau blood.

Baumann's May as now known in Kent does not coincide with the description given in Hogg's Manual (5th Edition) and can hardly be the same variety.

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* This cross has also been made at other centres, in every case successfully.

It seems, however, to resemble the variety described in the "Cherries of New York" (Hedrick) under this name, and it is there suggested as a good polliniser for early cherries.

Cross between Goodenston Black and Early Rivers.—The next crosses were made at South Street Plantations near Selling. Early Rivers does not fruit so well here, although the trees are healthy and receiving the best cultural treatment.

There are no trees of Baumann's May in this orchard, and the soil and situation are very similar to the Gushmere Court plantations. An early local variety of considerable merit is grown in this plantation under the name of Goodenston Black, and is some distance from Early Rivers.

Crosses were made here by conveying the pollen of Goodenston Black to some trusses of Early Rivers. The operations were performed on the same lines as already described. It was afterwards found that all the blooms pollinated with the pollen of Goodenston Black set fruit.

Other Pollinisers.—At Newton plantations on a heavier soil and at a higher elevation, the Early Rivers were overlapped by every variety, that is to say, every variety of cherry in the plantation was in full bloom several days before Early Rivers were over (out of bloom).

Crosses were made with Amber Bigarreau and Early Rivers and the blossoms pollinated all set fruit. This cross, however, is of little value, as in most instances Amber Bigarreau would be rather late for the first crop of bloom on Early Rivers on many early plantations.

Observations in other orchards where Early Rivers trees were fruiting well, and had done so in the past, seemed to point to the advantage of Turk, Elton and Knight's Black as pollinisers for Early Rivers.

In the majority of cases Turk was the variety in admixture.

At Bath's Limited, Wisbech, some Early Rivers crop well every season, and in this instance Knight's Black appears to be the polliniser.

Certain Varieties as Pollinisers.—*Elton or Elton Heart* is a very desirable white cherry, with pale rosy blotches and sometimes a crimson flush on the exposed side; the flesh is firm, sweet, and juicy, and when well-grown the fruit is large. The tree has a slightly weeping habit, and the foliage is pale-green in colour with long stipules.

On some plantations it grows well, but owing to the fact that many growers find it rather an uncertain cropper, with a tendency to die back and canker, fewer young trees of this variety have recently been planted; indeed, the writer has not come across a young plantation with this variety included. As soon as a variety becomes unpopular, large growers cease propagating it, while young planters who seek advice are dissuaded from planting. In this way the variety gradually disappears from a district; there are several varieties in this category at present. Many of the old varieties, once common, seem to have gone in the same way.

At Bloer's Farm, Rainham (Mr. Stewart), crosses were made on Elton, which was the most unsatisfactory variety in a large plantation. The pollinator was Early Rivers. This variety was at some distance from the Eltons, and if the crosses had been satisfactory, inter-planting with Rivers would have been suggested. The muslin bags, however, were apparently too much of an attraction for the natives, and they were taken off and otherwise interfered with, to such an extent as to render any scientific conclusions very unsafe.

At the plantations of Mr. Knowles, Nailbourne, near Faversham, Elton is again the variety which crops lightly. In this orchard, which is a very old one, there are no Early Rivers, this variety being of too recent introduction. At the time of the visit, the only variety in bloom in the vicinity was Governor Wood. Pollen was conveyed from this variety to Elton, and the pollinated blossoms all set.

At the time of the cross it was apparent that Elton was three parts over while Governor Wood was only coming to its best, and it would, therefore, not seem a safe recommendation to suggest Governor Wood as a mate for Elton. Some other crosses were made, but are not worthy of note as there was a great disparity between the blooming periods of the varieties.

Another season it would be well to see whether Elton will set freely with its own pollen. If it should prove to be self-fertile the writer would conclude that its liability to frost is, to some extent, the cause of its failure. Early Rivers and Turk should also be selfed.

Turk or Black Tartarian is a variety which is very extensively grown. Although it is an early bloomer it ripens its fruit comparatively late. The fruit when quite ripe, is coal-black and very handsome. The foliage is deep green and very broad, the leaves being larger than those of any other cherry. The tree is a very erect grower. The fruit has a rather shorter and thicker strig than Elton.

Experiments with this variety should be made to ascertain whether it is self-fertile. Up to the present it has been assumed that it is not, but the assumption is only based on the fact that it does not set well in some seasons. As already mentioned, there are indications that it is liable to frost and this may account for its failures.

There would appear to be a mutual affinity between this variety and Early Rivers, and it is probably a good polliniser for several other varieties.

Amber or Kentish Bigarreau is the most extensively cultivated variety of cherry in Kent. Mr. Bunyard describes it as "the most profitable cherry grown and the glory of the Kent orchards."

The fruit is shaded and blotched red and orange and the flesh is deep primrose in colour, crisp, juicy, and of rich flavour.

This cherry usually bears heavily if mixed with or surrounded by other varieties.

All varieties in bloom with it seem to pollinate it. Frogmore Biggareau and Governor Wood and Waterloo seem to suit it. When, however, this variety (Amber Bigarreau) is completely isolated, it soon shows its sterility.

There are several cases in evidence in which, owing to a desire on the part of the grower to increase this variety out of proportion to all others, it has been planted in isolated blocks. In every case where this isolation has taken place the results have been very disappointing. There are two notable cases, one at Rainham and the other at Sevenoaks; in the latter case 18 acres of this variety had, up to a few years ago, never borne, and the eventual bearing was brought about by the introduction of Frogmore Bigarreau.

Waterloo Black is one of the best mid-season, dark-fleshed cherries. The flesh is sweet and very rich, and the fruit is well protected by the foliage so that it is not so liable to crack (split) in showery weather. This is a most valuable point to the grower, and if the consumer only knew the variety and could get it when in season he would eat no other cherry. It is widely distributed over Kent, but not so well known outside the county. It resents at once an isolated position. Some growers have increased it out of proportion to their other varieties and have suffered severely from want of crops, over long periods.

The largest plantation of Waterloo Black cropping well which was visited was at Gosmere near Faversham (Mr. R. B. Amos). The plantations of this grower are on high ground, and the only effect noted was that all varieties were several days later than down in the Faversham valley. The trees were very healthy and cropping very heavily. The Waterloos were interplanted with Amber Bigarreau in equal proportions in alternate rows. This certainly seemed to be an ideal combination for pollination purposes.

The plantations of Mr. Dean, near Sittingbourne, were next visited. Here there are several acres of Waterloos which have never borne a full crop. The trees were very clean and healthy and were producing an abundance of bloom. It was stated that they have bloomed profusely for a number of years. Crosses were made in this block by bringing pollen of Amber Bigarreau and fertilising and bagging several trusses of Waterloo. The operations were entirely successful and every fertilised blossom set fruit. The crossing here was very striking, as all over the trees only an odd fruit had set while all the trusses fertilised were a picture.

At the opposite corner of the Waterloo plantation from where the crosses were made there are a few Amber Bigarreaus, and their influence on the Waterloos was most marked. The outer row of Waterloos next the Ambers was carrying a heavy crop, and for one or two rows inwards the crop was good. It then gradually fell off as the distance from the Amber was increased. The crosses here were most impressive and were fully appreciated by the manager. In 1916, the same conditions occurred on this plantation, the two rows nearest the Ambers cropping heavily while the rest of the plantation cropped very lightly. The nearest row of the Ambers was distinctly the best.

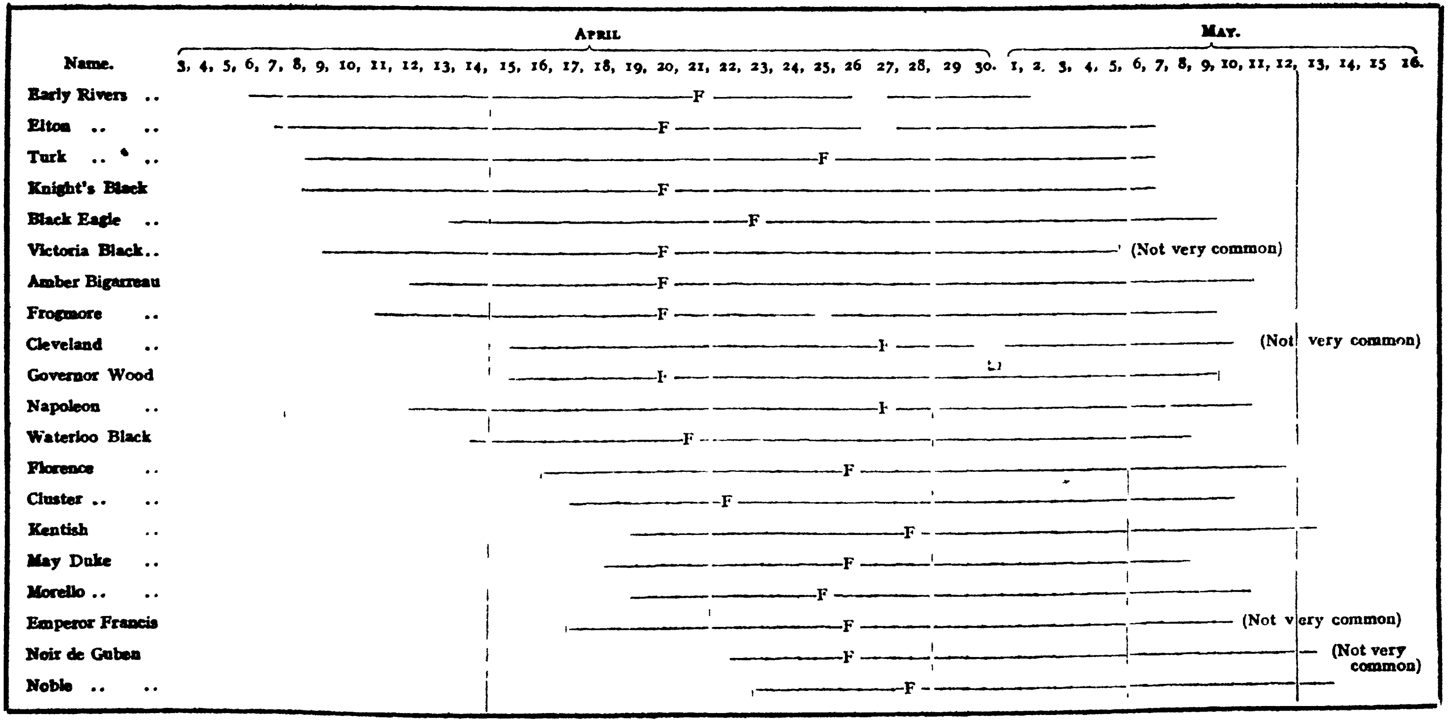
At the orchard of Mr. Thomas, in the same district, Waterloos crop very badly. They are young, healthy trees, producing an abundance of bloom, but apparently owing to the absence of a suitable mate they never set their fruit. There are no Amber Bigarreaus near them, and the nearest varieties appear to have no effect as pollinators. A variety is grown here known as Cleveland Bigarreau, which appears to be at home and crops heavily.

Observations at other centres seem to confirm the assumption that there is a mutual affinity between Amber and Waterloo.

Old Varieties.—Some of the old varieties might be worth working on modern stocks. *Reynold's Heart* and *Bloer's Black* are two very fine old varieties which are fast dying out.

In some other counties there are also valuable old varieties. In the county of Buckingham many of these occur. The general system of planting in this county seems to have been

Blossoming Periods of Cherries in Kent.



F = Full Bloom.

This Table represents the Faversham district of Kent, and would be subject to variation in different districts, on different soils, and in different seasons.

never to plant two trees of the same variety in proximity. The orchards are very mixed and the picking laborious, but there are no pollination difficulties.

General.—The culture in Kent amongst the best growers is in advance of any cherry culture in other counties. Like every other fruit the cherry responds to good cultivation. There is a remarkable difference between the size and quality of the fruit from an orchard that is being manured and heavily stocked and that from an orchard which is being starved.

It would appear that there is great scope as well as need for investigation amongst British cherries.

The season of blooming, however, is short; indeed, the whole cherry season from first bloom to the end of fruit picking is only, at the most, 4 to 5 months. This being the case it is impossible to cover a large area during the season when work in the way of crossing could be done.

Probably only a few of the problems have been touched upon in this report. Many other varieties are extensively grown and difficulties exist amongst them also.

It would appear that only by observations in the open will be secured definite information which will be applicable under natural conditions.

The diagram on p. 297 shows the flowering period of the principal varieties of cherry met with in the Faversham district. The periods represent an average of observations over four years. It seems to prove that all varieties are in bloom together for a certain period. No variety is out of bloom before any other variety comes in; they all overlap. It will be seen in a general way from the table of blooming periods: (1) that early varieties come into full bloom very gradually; (2) that mid-season varieties come to full bloom more rapidly; and (3) that late varieties come very rapidly to full bloom and go off more slowly.

In 1916, owing to pressure of work due to the War, it was not possible to carry out the desired selfing tests. The orchards were, however, all visited during the fruiting period, and the suggestions which presented themselves in 1915 seemed again to be corroborated, but the foregoing notes can only be looked upon as an introduction to the subject. If, however, they are the means of inducing any growers under whose observation they may fall to be more observant, a good purpose will be served. All communications on the subject will be of great interest to the writer, especially if they deal with sterile blocks or suitable combinations.

BURIED WEED SEEDS.

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ONE of the most widespread beliefs among English farmers is that whenever land that has not been disturbed for long periods is ploughed or dug up a large crop of arable weeds, usually charlock or poppy, will be forthcoming the following year. If a deep well be dug, charlock is said to spring up on the dumped material; if an old pasture, that has been under grass for time immemorial, be broken up, still the armies of charlock or poppies are said to appear. The quantities of plants reported are far too large to admit the supposition that the seeds could have been transported by birds or wind after the ploughing, and it is popularly assumed that they have been buried in the soil for many years, awaiting a favourable opportunity to germinate.

In the course of several years' research on the weeds of cultivation, this matter has been reported again and again. Careful inquiry showed that many of the instances did not rest on sufficient evidence to justify their acceptance. In other instances there was obviously much truth in the statement, but still closer investigation showed that most of the authentic cases were on land which had at some time or other been under arable cultivation, and were not on real old pasture.

During the last 18 months, experiments have been carried out at Rothamsted to ascertain what seeds capable of germination are present at different depths in soils under differing cultural conditions. Arable fields, old pasture, and pastures of varying ages have been laid under contribution. A sampling iron, 6 in. by 6 in. by 9 in., was driven into the ground flush with the surface. The soil was then carefully removed inch by inch and placed in paper bags labelled with the depth, the tool being driven in further in order to get the soil to a depth of 12 in. The samples were transferred individually to clean, sterilized pans or boxes in a glass-house. The soil from the lower depths was chiefly clay, and this was broken up into small pieces with the fingers; after some months a certain amount of disintegration of this sticky clay took place. The soil was kept moist and left alone. Before long, seedlings began to put in an appearance, and as soon as each was big enough to identify, it was noted and removed from the soil. Occasionally, when the earth became badly caked, it was cut up and stirred about with a knife, care being taken that no crumbs of soil were transferred from one pan to another. In most cases three or four holes were sampled in each field, but in the tables below the results for each depth from all the holes are added together.

A—**Old Pasture.**—Samples were taken from two pieces of land that have never been arable as far as is known, but have always been under grass. On Harpenden Common the soil is fairly light in texture, in Rothamsted Park it is heavier and carries good grazing pasture.

(1) *Harpenden Common.*—This has probably never been cultivated. Very few weed seeds germinated at all, not a single arable weed appearing. A very large number of grass and woodrush seeds were present in the first inch or two of soil, and a few grasses were scattered at lower depths; otherwise 4 yellow bedstraw (*Galium verum*), 2 yarrow (*Achillea millefolium*) and 1 vetch (*Vicia* sp.) represented the whole crop of the nine months' experiment.

(2) *Rothamsted Park.*—This land has been under grass for at least 300 years. Numerous seeds germinated down to a depth of 10 in., 240 seedlings of grassland plants other than grasses and clovers putting in an appearance in the 1 sq.-ft. area covered by the four holes. Three arable seedlings came up in addition, one charlock, one orache (*Atriplex patula*), and one either orache or fat hen. The seeds of charlock and fat hen are very heavy and offer no facilities for wind transport. Orache seed remains enclosed in its envelope, but the weight of the seed renders it improbable that the wind is an effective agent in the distribution of the plant. The nearest arable field to the sampled area is nearly half-a-mile away, and a wood intervenes, so that it is most unlikely that even the orache was carried to the park by wind. Possibly the seeds had at some time been carried on to the land sticking to the feet of horses and had worked their way down. They may even have been introduced by sheep, as up till 1874 it was the custom to graze off the aftermath in this part of the park.

These two instances illustrate the fact that arable weed seeds are absent from old pasture land, except for an occasional seed that must have come in from outside by accidental means.

B—**Pasture. Originally Arable.**—Several fields were investigated which were originally tilled but which have been under grass for a varying number of years. In one case (New Zealand Field) the samples were taken on the grassland just before it was ploughed up in 1915 and field notes were made in 1916, so that a comparison is possible between the glasshouse and field results.

(1) *Geescroft Field.*—Geescroft was used for various expert ments up to 1878, but, as the land was very wet and unfavourable for working, it was left fallow for several years and was finally joined up with the park in 1885, so that the area has been under grass for 32 years. Geescroft is very remote from the nearest arable land, so that the possibility that the weed seeds had been carried by wind is very small.

TABLE I.—*Geescroft Field. Holes* 1, 2, 3, 4.

—	Depth in inches.												Totals for each Hole	Grand Total
	1	2	3	4	5	6	7	8	9	10	11	12		
Scarlet Pimpernel (*Anagallis arvensis*)	–		–		2	–	2				–	–	0+ 1+ 1+ 2	4
Orache (*Atriplex patula*) .	–			–		–	1	–	1	–	1	–	1+ 0+ 2+ 0	3
Forget me-not (*Myosotis arvensis*)	–	1	–	–	–	–	–	–	–	–		–	1+ 0+ 0+ 0	1
Poppy (*Papaver* sp.) ..	–			–	1	–			–	–	1	1	0+ 0+ 0+ 3	3
Knotgrass (*Polygonum aviculare*)	–	2	3	4	3	13	9	6	6	2	3	1	9+18+ 6+19	52
Black Bindweed (*Polygonum Convolvulus*) ..	–	–	–	1	–	–	–	–	–	–	–	–	0+ 1+ 0+ 0	1
Field Speedwell (*Veronica agrestis*)	1					–		–	–	–	–	–	0+ 1+ 0+ 0	1
Umbelliferæ spp.	–	–		–	–	1	–	2	2	–	–	–	0+ 2+ 0+ 5	7
Totals	1	3	3	5	8	14	12	8	9	2	5	2	11+23+ 9+29	72

Table I. shows that a large number of typical arable weed seeds were present in the soil, knotgrass (*Polygonum aviculare*) being specially abundant. The numbers are so high that all possibility of accidental infection is excluded, and it may be taken that practically, if not entirely, all the seeds were present in the soil when it was grassed over in 1885, and that they have lain dormant ever since awaiting an opportunity to germinate. If knotgrass seeds were in the same proportion over the whole area, more than two million would be present per acre. Such a calculation is merely of relative value, but it serves as a proof that the presence of the knotgrass is not merely accidental, but that a very large number of seeds must have retained their germinating capacity during the 30 years they have been buried in the soil. Besides the arable seeds there appeared 43 seedlings of plants that occur both on arable and grassland, and 352 seedlings of plants characteristically associated with grassland and not seen on arable soils. It is very noticeable that the greatest number of grassland seeds occur in the top 4 in. of soil, whereas most of the arable seeds are 5 to 9 in. below the surface, indicating that the arable seeds that were initially present in the surface soil either germinated or died, while those lower down in the soil have been under conditions which hindered germination but preserved the capacity for growth.

The old Rothamsted records show that all the weeds which appeared from buried seeds in 1916 were present among the arable crops in 1867, furnishing additional proof that the seedlings are really derived from seeds buried in the ground when the area was grassed over. None of these weeds now appear among the surface vegetation of Geescroft, with the exception of *Myosotis arvensis*, which is able to hold its own on grassland.

(2) *Barnfield* (*grass*).—This area was under arable cultivation until about 1874 and was then laid down to grass.

Far fewer arable weeds are evident here than in Geescroft, but there are also fewer grassland weeds. Field observations showed that comparatively few species, other than clovers and grasses, occur in the surface vegetation of the field, thus accounting for the paucity of species in the underlying soil.

TABLE II.—*Barnfield Grass. Holes* 1, 2, 3, 4.

—	Depth in inches.												Totals for each Hole.	Grand Total.
	1	2	3	4	5	6	7	8	9	10	11	12		
Orache (*Atriplex patula*) ..	–	–	–	–	–	–	3	–	4	–	–	–	0+ 0+ 5+ 2	7
Charlock . ..	–	–	–	–	–	2	–	–	–	–	1	–	0+ 0+ 3+ 0	3
Small Toadflax (*Linaria minor*) . .	–	–	–	–	–	1	–	–	–	–	–	–	1+ 0+ 0+ 0	1
Forget me-not (*Myosotis arvensis*) . .	–	–	–	1	–	–	–	–	–	–	–	–	0+ 1+ 0+ 0	1
Poppy (*Papaver* sp)	–	1	–	–	–	–	–	–	–	–	–	–	0+ 1+ 0+ 0	1
	–	1	–	1	–	3	3	–	4	–	1	–	1+ 2+ 8+ 2	13
Totals	–	2	–	2	–	6	6	–	8	–	2	–	2+ 4+16+ 4	26

(3) *New Zealand Field.*—This was under ordinary farm cultivation until about 1906 ; it was then seeded down and worked as a pasture until 1915, in the autumn of which year it was ploughed up. The samples were taken before the ploughing, two sets of four holes being sampled in August and September. Tables III. and IV. show the large numbers of arable weeds which germinated up to December 6th, 1916.

After the ploughing, great crops of arable weeds came up in the field, charlock, poppy, orache, dwarf spurge, large field speedwell, and chickweed being especially abundant. Every arable weed represented in the " buried seeds " pans appeared in the field weed crop, with the single exception of *Arenaria serpyllifolia*, which was probably overlooked on the field or confused with small *Stellaria media*. It was rather surprising that comparatively little knotgrass was evident on the field, as such large numbers appeared in the greenhouse.

TABLE III.—*New Zealand Field. Holes* 1N, 2N, 1S, 2S.

—	Depth in inches. 1	2	3	4	5	6	7	8	9	10	11	12	Totals for each Hole.	Grand Total.
Orache (*Atriplex patula*) ..	–	2	7	5	6	7	3	8	9	24	8	26	24+ 6+40+35	105
Thyme-leaved Sandwort (*Arenaria serpyllifolia*) ..	–	–	–	–	1	–	–	–	–	–	–	–	1+ 0+ 0+ 0	1
Lady's Mantle (*Alchemilla arvensis*)	–	–	–	–	–	–	1	–	–	–	–	–	0+ 0+ 1+ 0	1
Charlock (*Brassica* sp) ..	1	1	1	1	3	1	–	2	–	1	–	–	0+ 6+ 3+ 2	11
Shepherd's Purse (*Capsella Bursa-pastoris*)	–	–	–	1	1	–	–	–	–	–	–	–	0+ 0+ 0+ 2	2
Dwarf Spurge (*Euphorbia exigua*	2	3	2	2	3	1	1	–	–	–	–	–	7+ 2+ 5+ 0	14
Nipplewort (*Lapsana communis*)	–	–	–	–	–	1	–	–	–	–	–	–	0+ 0+ 1+ 0	1
Poppy (*Papaver* sp) ..	6	9	5	13	15	11	4	2	–	–	–	–	6+36+15+ 8	65
Knotgrass (*Polygonum aviculare*)	4	7	7	5	5	7	5	1	4	19	1	–	32+ 1+17+15	65
Corn Sowthistle (*Sonchus asper*)	7	5	7	11	7	3	–	–	–	–	–	–	29+ 6+ 3+ 2	40
Field Speedwell (*Veronica agrestis*)	12	9	1	7	2	–	1	–	–	–	–	–	3+ 1+18+10	32
Ivy-leaved Speedwell (*Veronica hederæfolia*).. ..	3	2	3	5	3	1	1	–	–	–	–	–	2+ 4+ 5+ 7	18
Large Field Speedwell (*Veronica Tournefortii*) ..	26	7	14	7	1	1	–	–	–	–	–	–	23+ 5+15+13	56
Wild Pansy (*Viola tricolor*)	1	–	–	–	–	–	–	–	–	–	–	–	1+ 0+ 0+ 0	1
Totals	62	45	47	57	47	33	16	13	13	44	9	26	128+67+123+94	412

TABLE IV.—*New Zealand Field. Holes* 1BN, 1BS, 2BN, 2BS.

—	Depth in inches. 1	2	3	4	5	6	7	8	9	10	11	12	Totals for each Hole.	Grand Total.
Orache (*Atriplex patula*) ..	1	4	10	5	9	6	10	11	4	16	12	–	12+35+26+15	88
Charlock (*Brassica* sp) ..	–	2	3	–	4	2	–	–	–	–	–	–	1+ 6+ 2+ 2	11
Dwarf Spurge (*Euphorbia exigua*)	2	4	5	4	3	4	1	1	–	–	–	–	7+ 1+ 8+ 8	24
Forget-me-not (*Myosotis arvensis*)	4	3	3	–	–	–	–	–	–	–	–	–	3+ 2+ 4+ 1	10
Poppy (*Papaver* sp) ..	9	18	6	7	5	1	2	–	–	–	–	–	0+10+ 6+32	48
Knotgrass (*Polygonum aviculare*)	8	4	10	7	9	8	1	4	3	–	1	–	5+13+31+ 6	55
Corn Sowthistle (*Sonchus asper*)	–	1	2	3	5	2	–	–	–	–	–	–	2+ 5+ 4+ 2	13
Field Speedwell (*Veronica arvensis*)	10	1	1	2	3	1	–	–	–	–	–	–	1+ 0+13+ 4	18
Large Field Speedwell (*Veronica Tournefortii*) ..	10	5	4	2	3	–	–	–	–	–	–	–	16+ 1+ 3+ 4	24
Ivy-leaved Speedwell (*Veronica hederæfolia*).. ..	1	1	8	3	4	3	–	–	–	–	–	–	2+ 1+ 9+ 8	20
Wild Pansy (*Viola tricolor*)..	–	–	1	–	–	–	–	–	–	–	–	–	0+ 0+ 1+ 0	1
Totals	45	43	53	33	45	27	14	16	7	16	13	–	49+74+107+82	312

(Other weeds, common to arable and grassland, also appeared, including Chickweed (*Stellaria media*), Greater Plantain, Docks, Mouse-ear Chickweed and Common Sowthistle.)

It may possibly be that knotgrass is somewhat exacting with regard to the conditions for germination, and that these conditions were supplied in the greenhouse and not in the field. In most pot-culture work under glass, knotgrass is one of the most frequent weeds, showing that the seeds do grow well under such circumstances.

C—**Arable Land.**—Three arable fields were examined. One of these has been under ordinary farm management under rotation cropping, and two have been used for specialised experimental work for many years under continuous and rotation cropping respectively. The method of treatment of the soil has had a radical influence on the weed flora, as the tables show.

(1) *Long Hoos Field.*—This field was under ordinary farm management.

TABLE V.—*Long Hoos. Arable. Holes* 1, 2.

—	Depth in inches.												Totals for each Hole	Grand Total.
	1	2	3	4	5	6	7	8	9	10	11	12		
Lady's Mantlo (*Alchemilla arvensis*)	3	3	10	12	3	7	9	2	4	—	—	—	25 + 28	53
Scarlet Pimpernel (*Anagallis arvensis*)	—	—	—	—	—	—	—	1	—	—	—	—	0 + 1	1
Thyme-leaved Sandwort (*Arenaria serpyllifolia*) ..	15	19	44	15	31	7	11	4	4	1	1	—	109 + 43	152
Orache (*Atriplex patula*) .	1	3	1	1	4	1	4	1	—	7	1	—	24 + 0	24
Orache or Fat Hen (*Chenopodium album*) ..	—	—	—	—	—	—	2	—	—	17	1	3	20 + 3	23
Charlock (*Brassica* sp)	—	3	1	1	3	2	—	2	1		2	—	8 + 8	16
Dwarf Spurge (*Euphorbia exigua*)	1	1	—	—	—	4	—	1	2	—	—	—	5 + 4	9
Cleavers (*Galium Aparine or tricorne*) .. .	—	—	—	—	—	—	—	—	—	—	—	1	1 + 0	1
Mayweed (*Matricaria inodora*) .. .	8	12	24	6	9	10	4	1	—	—	1	5	39 + 43	82
Forget-me-not (*Myosotis arvensis*)	2	—	3	—	—	—	1	—	—	—	—	—	0 + 6	6
Poppy (*Papaver* sp) .	—	1	2	—	—	—	—	1	—	—	—	—	4 + 0	4
Knotgrass (*Polygonum aviculare*)	—	1	5	2	1	7	2	2	1	1	—	—	8 + 14	22
Black Bindweed (*Polygonum Convolvulus*) .. .	—	—	—	—	—	—	—	1	1	—	—	—	1 + 1	2
Willow weed (*Polygonum Persicaria*) . .	—	—	—	—	—	2	—	2	—	—	—	—	3 + 1	4
Corn Sowthistle (*Sonchus asper*) . ..	—	—	—	1	—	—		—	—		—	—	0 + 1	1
Field Speedwell (*Veronica arvensis*) . . .	3	4	1	1	3	5	—	—	—	—	—	—	10 + 7	17
Ivy-leaved Speedwell (*Veronica hederæfolia*) . .	—	1	1	—	—	—	—	—	—	—	—	—	2 + 0	2
Large Field Speedwell (*Veronica Tournefortii*) .	—	5	22	26	19	—	7	—	—	—	—	—	70 + 9	79
Veronica sp	3		3	—	—	9	2	4	3	—	—	—	11 + 13	24
Umbelliferæ sp	—	—	—	—	—	—		—	1	—	—	1	2 + 0	2
Totals .	36	53	117	67	73	54	42	22	17	27	6	10	342 + 182	524

The figures show the position quite clearly. As was to be expected, the actual number of weed seeds which germinated is far above the number of those in the soils which had been grassed over. As only two holes were examined, covering an area of ½ sq. ft., some idea is given of the enormous number of weed seeds, capable of growing, that are present in the soil of an ordinary tillage field. Even now it is not probable that all the seeds have germinated, and with the coming of warmer weather the present total of 524 (representing over 45 million seedlings per acre) may be considerably increased.

(2) *Agdell Field.*—This plot has been under rotation experiments for 59 years since 1848, and has not received any

manure. Two samples were taken just after the field had been under a root crop. Cultivating between the roots tends to cut off the seedlings before they have time to flower and form fresh seeds, so that the soil was fairly exhausted of its weed seeds and only a few orache and fat hen seeds were left to germinate. The poverty of the soil, caused by the long period without manure, was a further contributing cause to the paucity of the weed species. A number of seedlings died without developing, but probably most of these belonged to the same two species.

TABLE VI.—*Agdell Field. Plot* 5. *Holes* 1, 2.

—	Depth in inches												Totals for each Hole	Grand Total.
	1	2	3	4	5	6	7	8	9	10	11	12		
Orache (*Atriplex patula*) ..	–	1	–	–	–	–	1	–	–	–	–	–	1 + 1	2
Fat Hen (*Chenopodium album*)	–	–	4	–	1	–	–	–	–	–	–	–	0 + 5	5
Orache or Fat Hen? .	–	–	–	1	2	–	1	–	–	–	–	–	0 + 4	4
Totals	–	1	4	1	3	–	2	–	–	–	–	–	1 +10	11

(3) *Barn Field.*—This plot has carried root crops for 74 years in succession, since 1843, and has received no manure since 1853. The number of weed seeds is consequently very low, partly because the constant tillage has prevented seed production and partly because of the poverty of the soil due to continuous cropping without manure. Only six seedlings appeared, 3 dwarf spurge, 2 corn sowthistle, and 1 large field speedwell.

Transport of Arable Weed Seeds.—In dealing with the arable weeds that appear in broken-up pastures the question arises as to whether the seeds had been carried to the area by wind and then washed down by rain or taken into the soil by worms or moles. Wind transport, however, is not possible with most of the species met with during the experiments. The seeds of scarlet pimpernel, charlock, knotgrass, black bindweed, dwarf spurge, willow weed and several other species are too large or too heavy to float in the air, and they have no parachute or wing to aid in wind dispersal. Orache, in spite of its envelope, is too heavy to be carried a great distance. Only the very small and light seeds, such as poppy, sowthistle, and other composite species lend themselves to wind dispersal to any appreciable extent, but these were not present in sufficient numbers to alter the value of the results. Also, Harpenden Common, Rothamsted Park and Geescroft are so far from the nearest arable land that it is unlikely that wind-borne seeds are able to reach the areas unless they are very specially adapted to this method of transport.

Conclusions.—From the above results the following practical conclusions may be drawn:—

(1) If very old pasture be ploughed up it is improbable that arable weeds will appear to any great extent the first year. Some few seeds, as those of groundsel, sowthistle, and dock, may be carried by the wind, and other arable weeds may be introduced in various ways, with the crop seeds, etc., so that, in the course of a very few years even broken-up old pasture can become colonised by a typical arable weed flora.

(2) If more recent pasture, 30 or 40 years old, be broken up, the case is different. The seeds of certain weed species are capable of lying dormant in the soil for long periods of years and of germinating when the land is broken up and conditions of growth become favourable. Most of the weed seeds in the top few inches of soil tend to germinate although the land is grassed over, and the seedlings are stifled by the grasses and clovers. Consequently, there are less germinable weed seeds in these top inches when the land is ploughed. Seeds in the lower depths, especially from 5 to 9 in., are unable to germinate owing to unfavourable conditions. These seeds retain their power of growth for a long time, but they gradually die off with the progress of years. The length of time such seeds can lie dormant varies with the species. There are, again, usually fewer seeds in the lowest 3 in. because under ordinary conditions of cultivation only about 9 in. of the soil is well worked; any seeds in lower depths have had to work their way down through cracks and crannies and wormholes into the harder layers of the subsoil.

(3) Land under ordinary farm tillage contains great numbers of arable weed seeds capable of growing, especially in the top 7 in. of soil which is best cultivated. These seeds do not necessarily all germinate the year after they are shed, but a certain proportion lie dormant for varying periods and start into growth among later crops.

(4) The methods of cultivation and manuring have an important bearing upon the number of weed seeds that are present in the soil. Root crops are valuable aids in cleaning the land, as the constant hoeing not only cuts off young seedlings, so clearing the land for the standing crop, but also prevents the weeds from forming seed, so that later crops are likely to be freer from weeds.

EXPERIMENTS ON THE PREPARATION OF HOME-MADE RENNET.

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SINCE the publication in this *Journal*[*] of the second paper dealing with the preparation of home-made rennet from fresh vells, further experiments have been carried out, the results of which are given below.

In the earlier experiments the largest numbers of vells used to 1 gal. of brine was 10, while in the present trials 15 vells have been added to the same quantity of brine, and one or two other alterations in the technique have been adopted. It may be well to describe briefly the method at present in use. The fresh vells are split open, the greater part of the contents shaken out, and any particles of clotted milk or of solid food which remain adhering to the mucous membrane are washed away in running water, but the vells are not allowed to remain in water for more than a few moments before being placed in the brine. Fifteen washed vells are then put into 1 gal. of brine which is made according to the method given in our first paper,[†] but recently it has been found necessary to filter the solution before use, as it contained dirt from the rock salt. The filtration is done through a coarse filter paper, but straining through a fine muslin would be quite effective. To the brine and vells, 2 oz. of boric acid are then added, the vessels are placed in a cool cellar, and the contents are stirred daily for a week or ten days, at the end of which time a milk-coagulation test is made. Coagulation tests are repeated at intervals, and at the same time the mucous membranes of the vells are examined to see whether they have become sufficiently soft to be readily scraped off. When this condition is reached, the extract is strained off through a cheese-cloth and the vells are removed from the bundle and placed on a grooved and slanting board, where the mucous membrane is carefully removed with a blunt scraper and returned to the original extract (first steep), while the scraped vells are placed in half the original quantity of fresh brine (second steep). The first steep is kept for a further period of time until it attains a suitable strength; it is then filtered through cotton-wool filters[‡] and it may be mentioned here that if a small funnel is used inside the larger one, it is desirable that the stem of the inner funnel should be cut off at its base. After filtration the rennet should be bottled and stored in a cool, dark place.

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[*] See September, 1916, p. 549. [†] See *Journal*, August, 1916, p. 460.
[‡] See *Journal*, August, 1916, p. 461.

The second steep is treated similarly to the first steep, except that the vells are not scraped. It is generally found necessary to leave them in the second brine for a longer period than in the first before a usable rennet is obtained, and as a rule, the second extract is considerably weaker than the first.

It has been found that extracts prepared in this way are frequently as strong as commercial rennet, and retain their coagulating properties for several months after preparation; in many cases they even improve considerably with storage. It is not possible at this stage of the work to state definitely how long the rennet will retain its strength, but an extract which was made nine months ago is stronger now than when first prepared, and none have been found to deteriorate in less than three months unless preservative was left out, or unless the vells used were in a bad condition. Further, it has been shown that during storage the bacterial flora of rennet extract undergoes considerable modification, and whereas freshly-made extract from vells taken from grass-fed calves contained numerous organisms, including those of the *B. Coli* group, as time went on a very marked decrease in the total number of organisms occurred, and at the end of about six months no organisms of the *B. Coli* group were found in 1 cc. of the extract.

During the months of March and April, 1917, the following amounts of milk were made into cheese with home-made rennet:—

521	gal. into	Cheddar.	240	gal. into	Caerphilly.
50	,,	Cheshire.	800	,,	Soft Cheese.
98	,,	Smallholder.	87	,,	Derby.
296	,,	Kingston.			

All the cheeses made from this milk ripened normally, and were of good quality. Two rennet extracts were used, one of which was nine and the other seven months old.

Some of the experimental results obtained are shown in Table I.

This table shows the results obtained when dealing with two batches of vells called Nos. 4 and 5. The first batch, No. 4, contained 20 vells, 15 of which were placed in 1 gal. and 5 in ½ gal. of brine, and labelled, respectively, 4 (15) and 4 (5). The other batch contained 23 vells, 15 of which were placed in 1 gal. and 8 in ½ gal. of brine, and labelled, respectively, 5 (15) and 5 (8). The experiment was begun on the 17th August,

1916. Eleven days after being placed in brine the vells were scraped, and after the scrapings had been allowed to remain in the brine for another two days the extracts were filtered through cotton-wool in the usual way, having first been poured through fine cheese calico to free them as far as possible from fragments of mucous membrane which cause the filtering process to be very slow. Coagulation tests were made on these four extracts from time to time as shown in the table, and seven months after the experiment had begun the rennets gave tests of 31, 36, 27, and 24 seconds respectively. These

TABLE I.—*Results of Successive Coagulation Tests made on Rennet Extracts, September*, 1916, *to March*, 1917

Ref No of Extract	Vells put in Brine	Date of Test	Test	Date of Scraping	Date of Filtration	Date of Test	Test	Date of Test	Test	Date of Test	Test
	1916	1916	min sec	1916	1916	1916	sec	1916	min. sec	1916	sec
4 (15)	Aug 17	Aug 21	1 2*	Aug 28	Aug 30	Aug 31	46	—	—	Oct 24	28
4 (5)	Aug 17	Aug 24	1 43†	Aug 28	Aug 30	—	—	Sept 5	1 1	Oct 10	39
5 (15)	Aug 17	Aug 21	1 57*	Aug 28	Aug 30	—	—	Sept 5	0 52	Oct 24	26
5 (8)	Aug. 17	Aug 24	1 17†	Aug 28	Aug 30	—	—	Sept 5	0 46	—	—

Ref No of Extract.	Vells put in Brine	Date of Test	Test	Date of Test	Test.	Date of Test	Test	Date of Test	Test	Date of Test.	Test
	1916	1916	sec	1916	sec	1916	sec	1917	sec	1917	sec
4 (15)	Aug 17	Nov 10	30	Nov 17	27	Nov 24	30	Jan 27	35	Mar 14	31
4 (5)	Aug 17	—	—	Nov 17	36	Nov 24	37	Jan 27	41	Mar 14	36
5 (15)	Aug 17	Nov 10	27	Nov 17	22	Nov 24	20	Jan 27	29	Mar 14	27
5 (8)	Aug 17	Nov 10	31	Nov 17	24	Nov 24	37	Jan 27	29	Mar 14	24

* Acidity of milk, 0 19 per cent

† Acidity of milk, 0 185 per cent

results show not only that extracts prepared in this way can be kept for very much longer than was stated in our previous papers, but also that instead of deteriorating with storage they become considerably stronger, so that at the end of seven months these particular extracts were of approximately the same strength as commercial rennet. In two cases only has the strength of the rennet extract been found to decrease appreciably on keeping. In one case the vells had a very offensive smell at the time of their arrival at the laboratory, and though the extract increased in strength for

TABLE II.—*Coagulation Tests and Bacterial Examination of Rennet Extracts, November, 1916, to March, 1917.*

Ref. No. of Extract.	Vells put in Brine.	Date of Test.	Test.	Date of Test.	Test.	Date of Test.	Test.	Date of Test.	Test.	*B. Coli* found in
	1916.	1916.	sec	1916.	sec.	1916	min sec.	1916.	sec.	
8 (Large)	Sept. 25	Oct 6	45	Oct. 23	31	Nov. 7	0 26	Nov. 11	29	1/100 cc
8 (Small)	Sept. 25	Oct. 5	55	Oct. 23	32	Nov. 7	0 26	Nov. 11	30	1/1,000 „
9 (10)	Oct. 24	—	—	—	—	Nov. 1	1 9	Nov. 11	32	1/10,000 „
9 (11)	Oct. 24	—	—	—	—	Nov. 1	1 20	Nov. 11	57	1/10,000 „

Ref. No. of Extract.	Vells put in Brine.	Date of Test.	Test.	*B. Coli* found in	Date of Test.	Test.	*B. Coli* found in	Date of Test.	Test.	*B. Coli* found in
	1916.	1916.	sec.		1916.	sec.		1917.	sec.	
8 (Large) ..	Sept. 25	Nov. 18	29	1/1,000 cc.	Nov. 25	23	Absent.	Jan. 16	28	Absent.
8 (Small) ..	Sept. 25	Nov. 18	28	1/10,000 „	Nov. 25	23	1/10,000 cc.	Jan. 16	27	„
9 (10)	Oct. 24	Nov. 18	31	1/10,000 „	Nov. 25	30	1/10,000 „	Jan. 16	34	1/10 cc.
9 (11)	Oct. 24	Nov. 18	25	1/10,000 „	Nov. 25	35	1/1,000 „	Jan. 16	31	1/1,000 „

Ref. No. of Extract.	Vells put in Brine.	Date of Scraping.	Date of Filtration.	Date of Test.	Test.	*B. Coli* found in	Date of Test.	Test.	*B. Coli* found in
	1916.	1917.	1917.	1917.	sec.		1917.	min. sec	
8 (Large) ..	Sept. 25	Jan. 19	Jan. 29	Feb. 6	29	Absent.	Mar. 14	0 32	Absent.
8 (Small) ..	Sept. 25	Jan. 20	Jan. 29	Feb. 6	29	1/10 cc.	Mar. 14	0 32	„
9 (10)	Oct. 24	Jan. 19	Jan. 29	Feb. 6	35	Absent.	Mar. 14	1 10	„
9 (11)	Oct. 24	Jan. 19	Jan. 29	Feb. 6	31	„	Mar. 14	0 31	„

about two months, it then became too poor for use. The second case was that of a batch of vells in the second steeping of brine, to which no boric acid had been added in either the first or second steeping.

Table II. shows the results obtained from two batches of vells, Nos. 8 and 9. Batch 8 contained 40 vells which differed in size very considerably and which were roughly separated into large and small. The 20 larger ones were placed in 1 gal. of brine and the 20 smaller ones in a second gallon. Batch 9 contained 21 vells, of which 10 were placed in one half gallon and 11 in a second. These were labelled, respectively, 8 (large), 8 (small), 9 (10) and 9 (11). Since these extracts were made we have found that quite good rennet may be made by using 15 vells to 1 gal. of brine, and in all later work this number has been used.

In this experiment not only were coagulation tests carried out, but the extracts were also examined periodically for organisms belonging to the *B. Coli* group Sterile tubes of lactose-peptone-water were inoculated with quantities of the extract varying from 1 cc. to $\frac{1}{10,000}$ cc. and incubated at 37° C., the tubes being examined after 2 and 5 days for presence of acid and gas. The results show that the organisms gradually died out as the extracts got older, and that at the end of six months, no milk sugar fermenting organisms are found in any of the extracts. As before, the strength of the rennet increased with storage up to 5 months, after which a slight deterioration set in in three out of four extracts. Whether, with the crude coagulation test at present in use, such small changes have any real significance is not known, but further experiments will be carried out on this question.

A few words may be said about one of those batches of vells which were dealt with in the previous paper, namely, the second batch of fresh vells, which were tried with and without boric acid at the rate of 10 vells to 1 gal. of brine, the vells not being scraped. The results of the coagulation tests for these extracts are given in Table III.

After 9 months the strength of these extracts was maintained, and lactose-fermenting organisms were absent in 1 cc. From the results given in the three tables above, it will be evident that the extracts from different batches of vells vary considerably in their coagulating properties.

Summary.—(1) It has been shown possible to obtain by the method described, rennet extracts of a strength which not infrequently approximates to that of commercial rennet.

(2) These extracts retain their coagulating properties for a period of several months.

(3) The strength of the extracts is frequently found to increase during the period of storage.

TABLE III—*Coagulation Tests on Extracts from Fresh Vells, July, 1916, to March, 1917*

Ref No of Extract	Vells put in Brine	Date of Test	Test	Date of Test	Test	Date of Filtration	Date of Test	Test	Date of Test	Test
	1916	1916	Not in	1916	min sec	1916	1916	min sec		sec
2 (with Boric)	June 16	June 18	5½ min	July 10	2 35	July 12	July 16	2 30	—	—
2 (without Boric)	June 16	June 18	5 ,,	July 10	1 58	July 12	July 16	1 52	Oct 24	52

Ref No of Extract	Vells put in Brine	Date of Test	Test	Date of Test	Test	*B Coli*	Date of Test	Test	*B Coli*	Date of Test.	Test	*B Coli*
	1916	1916	sec.	1916	min sec		1917	sec		1917	sec	
2 (with Boric)	June 16	Nov 9	54	Nov 16	0 52	Absent	Jan 26	44	Absent	Mar 13	47	Absent
2 (without Boric)	June 16	Nov 9	46	Nov 16	1 23	,,	Jan 26	44	,,	Mar 13	48	,,

(4) The number of lactose fermenting organisms (evidence of dirt contamination) in the extracts diminishes with time.

(5) Numerous cheeses made from more than 1,300 gallons of milk by the use of these extracts have proved entirely satisfactory.

EXPERIMENTS WITH PEPSIN TO REPLACE RENNET.

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IN a previous communication* the results of a few preliminary tests with pepsin were summarised. It was desired to produce a pepsin solution which would keep fairly well and which would give the same results as rennet extract when used in the same way. Success was obtained in preparing a solution of pepsin which, when added to milk in the proportion of 1 drachm to 3 gal., gave a curd firm enough to cut in 1 hr. at 84° F. In this respect the pepsin solution gave the same result as a British brand of rennet used in the same way. The pepsin cheeses when sold were in every respect as good as the rennet cheeses. The (purchased) milk then received in the dairy was already fairly ripe, and Miss Prichard added ½ per cent. of starter for making the experimental Caerphilly cheeses. These experiments suggested that a standard rennet extract could be prepared by mixing the following ingredients (by weight):—

8·3 of 1–3,000 soluble pepsin powder, 2·0 of boric acid, and 20 of salt, to 100 of water.

The experiments have been continued with the co-operation of Miss H. M. Williams, N.D.D., B.D.F.D., and students. A filtered pepsin solution prepared as before was compared with Danish rennet extract, the dairy's supply of the British brand having been exhausted. The tests were conducted with 6 and 12-gal. vats of milk, the milk being subsequently worked up into Caerphilly and truckle Cheddar cheeses respectively. The first few tests at 84° F. gave the following results:—

	Rennet.	*Pepsin Solution.*
Amount used	1 drachm to 3 gal. in each case.	
No. of tests	14	6
Time till curd was cut—		
Maximum	1 hr. 40 min.	3 hr. 48 min.
Average	1 „ 13 „	2 „ 22 „
Minimum	35 „	1 „ 25 „

These figures at once showed that the substitute had very different properties from rennet extract. Reference to the cheese records showed that at least ½ per cent. of starter had been added to each lot of milk. The milk now coming into the dairy had an acidity of quite 0·2 per cent. (calculated as lactic acid), yet rennet tests showed that it was comparatively sweet milk (30–40 seconds, using 1 drachm to 4 oz. of milk at 84° F.). The ripeness of the milk was probably the factor governing the results, and the following experiment with 3 vats of milk confirmed this view :—

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* *Journal*, April, 1917, p. 57.

	Vat 1.	*Vat 2.*	*Vat 3.*
Starter added (per cent.)	2	1	½
Time ripened at 84° F. ..	½ hr.	1 hr.	1 hr.
Rennet test of ripe milk..	26 sec.	26 sec.	?
Pepsin solution added to each vat : 1 drachm to 3 gal.			
Time till curd was cut ..	1 hr. 40 min.	1 hr. 40 min.	2 hr. 40 min.

In the following tests a ripeness giving a 20-sec. rennet test was aimed at. This usually required about 2 per cent. of starter and an hour of ripening :—

1. Rennet, 1 drachm to 3 gal. at 84° F.—

	Ripeness of Milk.	*Time till Curd was Cut.*
	19 sec.	45 min.
	20 ,,	55 ,,
	20 ,,	60 ,,
	22 ,,	40 ,,
	19 ,,	61 ,,
	21 ,,	47 ,,
Average ..	20 sec.	51 min.

2. Pepsin solution, 1 drachm to 3 gal. at 84° F.—

	Ripeness of Milk.	*Time till Curd was Cut.*
	20 sec.	63 min.
	19 ,,	65 ,,
	22 ,,	63 ,,
	19 ,,	60 ,,
	20 ,,	56 ,,
	20 ,,	65 ,,
Average ..	20 sec.	62 min.

There is, of course, a considerable experimental error in these tests, but errors were eliminated as far as possible, and it is considered fortunate that such uniform results were secured in this series. The rennet tests were made with rennet extract. (In a few cases "rennet tests" were also carried out with the pepsin solution. The results of these investigations indicated the peculiar deduction that while the pepsin solution might give a somewhat quicker "rennet test" in these ripe milks, yet it acted a little slower in the bulk of milk.)

Pepsin is very much more sensitive to slight differences in the degree of ripeness of the milk than rennet extract. For this reason it is more difficult to use successfully, though it is cheaper. Good results, however, can be obtained with pepsin. One ounce of 1-3,000 soluble pepsin powder can coagulate 300 gal. of well-ripened milk, but evidently only half that quantity of milk ripened to a less degree.

In these circumstances it is interesting to find how pepsin behaves in sweet milk. The following tests were conducted with 1-gal. lots of milk, each subsequently made into a Smallholder cheese. The rennet was measured with a pipette marked off in hundredths of 1 c.c. and the temperature in each case was 84° F.

1. Sweet milk as purchased : rennet test, 32 sec.
⅓ dm. of rennet : curd cut in 1 hr. 15 min.
1 ,, of pepsin solution : curd cut in 1 hr. 40 min.
2. Sweet milk as purchased : rennet test, 30 sec.
¼ dm. rennet : curd cut in 1 hr. 30 min.
⅓ ,, ,, ,, ,, 22 ,,
1⅓ ,, pepsin solution : curd cut in 1 hr. 18 min.
1 ,, ,, ,, 2 ,, 3 ,,

These data are too scanty to be conclusive, but they suggest that 1 oz. of soluble pepsin powder will curdle only 75 gal. of "fresh" milk.

Good ripe Caerphilly, Smallholder, truckle Cheddar and Pont L'Évêque cheeses have now been made at Cardiff with pepsin, and in all cases the ripening was apparently normal. Mr. R. J. Drummond, of the Kilmarnock Dairy School, has evidently made successful Cheddar cheese with pepsin (reported in the *Scottish Farmer*) but he points out that serious risks are run by those using pepsin, as it requires to be carefully handled and thoroughly standardised.

THE WORK OF AGRICULTURAL EXECUTIVE COMMITTEES.*

Most of the Committees have now been at work for a month or more, and it is possible to get some idea of the general result of their activities. In this article it is proposed to deal with that part of their work which concerns the organisation of Committees and Sub-Committees and their duties under the Cultivation of Lands Orders.

1.—**Organisation of Committees.**—The chief variations in organisation seem to lie in the relations between the County Executive Committees and the District Committees. To get satisfactory and useful work out of District Committees three conditions seem, by general consent, necessary.

(1) They must be given definite, specific work to do by the County Executive Committee. They will not usually find work for themselves.

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* This article has been issued as Bulletin No. 1, Series B, by the Food Production Department of the Board.

(2) They must meet at regular intervals, preferably once a week, so that their members regard the meetings as a fixed engagement.

(3) Their work must be well co-ordinated with that of the County Executive Committee.

It is in the third of these conditions that there is room for variation in detail. Reports from different counties show not only that relations between the County Executive and the District Committees, as a matter of fact, are not everywhere the same, but also that a system which works well in one county needs revision in another. Indeed, as so often is the case, it is men and not measures that count.

Of several types of organisation, the following may be noted.

(*a*) The Chairmen of the District Committees form the Executive Committee, with or without the addition of other members.

(*b*) The Executive Committee is first formed, and the District Committees derived from it, each individual member of the Executive undertaking to act as chairman of one or more District Committees. The Executive officer of the Executive or his assistant often acts as secretary of the District Committees.

(*c*) The Executive and the District Committees are quite distinct, the District Committees having their own Chairmen and Secretaries who are not members of the County Executive. In this case, a weekly letter each way seems desirable.

Whatever type of organisation is adopted, it is essential that the County Executives should see that the District Committees have regular work to do. As one commissioner writes: "It is useless to create a Local Committee and expect it to remain in active existence unless definite and continuous work for it is provided."

The arrangement of work has been helped by the decision of the Board that grants of money can be made to the Secretaries of District Committees. A Commissioner writes: "The Board's circular with reference to honorariums is likely to encourage better work from District Committees. My Committee took immediate action on the circular, and decided to grant sums to their district clerks varying from £15 to £20 each."

If doubt exists about the efficiency of the Local Committees, it is well to hold an enquiry. This has already been done in some cases. Thus in a southern county: "At a meeting of the Executive on the 5th inst., a report was read by the Hon. Secretary with regard to the work of the District Committees.

There are twenty-two District Committees in the county, and the work of 10 of these was reported as good, seven as fair, and the remaining five as very indifferent. The Executive decided to take strong action in the matter, and, at the suggestion of the District Commissioners, the secretary was instructed to address letters to the offenders informing them that the Executive considered their work most unsatisfactory, and that, unless an improvement took place at once, they would be superseded."

One special point seems to need some attention: The co-operation between the men's and the women's committees, especially over labour problems. Thus one of the Commissioners reports: " At present there seems to be a want of co-ordination between the two sides of the work, *i.e.* those of the men's and the women's Committees."

But in many places the District Committees are already doing well, and are steadily improving in effectiveness. For instance, in a south-eastern county, the Commissioner reports: " The District Sub-Committees are as a rule doing excellent work; the report sent in by one Committee is a model of what such reports should be." Again, in a north-midland county, the Commissioner writes: " The District Committees now meet each week at regular times; weekly reports are sent in to the Executive Committee. . . . The Chairman of the District Committees present at the meeting of the Executive reported that their Committees were taking a great interest in the work; and it was felt that the Executive Committee would soon be in a position to review week by week the work going on throughout the county, to locate the weak places, to use the means at their disposal for the purposes of strengthening the organisation in such places, and so aim at bringing results throughout the county up to the standard set by the most active and thoroughgoing of the District Committees."

With regard to the work of the Executive Committees themselves, the reports from the different counties are on the whole satisfactory. The Executives meet regularly, at least once and in several counties twice a week. In some places, the Chairman or other members attend the office day by day to deal with routine work as it comes in. While some Executives are more effective than others, as a rule they seem to be acquiring a knowledge of their work and a firm grip of the business which comes before them.

2.—**The Cultivation of Lands Order.**—The administration of the Cultivation of Lands Orders is the most important and most delicate duty of County Executive Committees.

It is of course most essential that the Committees should obtain accurate and unbiased opinions on which to found their action. Here difficulties begin. One of the chief troubles is well illustrated by the two following extracts from reports of Commissioners on the working of the District Sub-Committees and their survey of lands. One Commissioner says: "The Local Committees . . . are, in my opinion, not manned sufficiently by practical farmers. Consequently a good deal of time is wasted in dealing with their reports, as they have to be referred back to a special panel of practical farmers and a valuer."

But the alternative view is expressed by another experienced Commissioner a week later. He says: "It is not easy to persuade Committees, most of the members of which are farmers, of the necessity of getting information as to the condition of the farms of their brother farmers, or of the importance of anything else than making things easy by providing labour, machinery, etc., for cultivation."

When the facts are ascertained, many possibilities lie before a County Executive Committee.

(1) *Advice and Recommendation.*—A mere recommendation is often enough to secure improved cultivation. "In the majority of instances," writes a Commissioner, "the farmers agree to carry out the suggestions of the Executives," and most other Commissioners report to the same effect. One County Executive, with a shrewd knowledge of human psychology, sends to the farmer concerned a form with a polite recommendation displayed on its face, and a list of the summary compulsory powers, which the Committee hold in reserve, modestly set forth on its back. The results are said to be satisfactory.

When the present occupier agrees to carry out the recommendations of the Executive, it is necessary to watch the progress of the changes, and to see that promises are performed. Here especially the District Committees can be useful.

(2) *Action by Consent.*—If a farmer is unable to fulfil the requirements of the Executive, it becomes necessary to take steps to supplement his efforts or to replace him by a more effective substitute. This can often be done by agreement. The Committee can help him by carrying out specific acts of cultivation, or by taking over or transferring to a neighbour some of his land—for instance the arable part of his farm, leaving him to deal with the grass.

When a tenant is thoroughly incompetent or unwilling, his tenancy must be determined summarily. Before invoking the powers of the Board of Agriculture, it is often possible to carry through the matter by agreement between owner and tenant under the advice and pressure of the Committee. A satisfactory tenant can then be installed, the owner may elect to farm the land himself, or the Committee may, as a last resort, undertake the cultivation

(3) *Compulsion.*—When all else fails, it becomes necessary to use compulsory powers And here the same courses are open to the Committee as in action by consent. They can direct the farmer to carry out an improved system of cultivation under penalties for non-compliance; they can enter and carry out specific work, such as ploughing or the application of manures, and recover the cost from the occupier; they can transfer part of his land to a neighbour or other substitute; they can ask the Board summarily to end the tenancy, replacing the man by someone more efficient, or farming the land themselves. In these cases, to prevent hardship, it is sometimes possible to leave the old tenant in possession of the house for a time.

Reports show that Executive Committees are taking action in all of these ways. Advice and persuasion are being used in numberless cases, and, where those methods fail, most Committees have no hesitation in applying some of their more drastic powers.

From one week's Reports from different counties the following examples of the action of Executive Committees may be given:—

"Arrangements have been made to take possession of one farm of 103 acres which was very badly reported on. About 200 notices have been served for improved cultivation for the 1917 crop, affecting approximately 3,000 acres. Notices have also been served for the breaking up for the 1917 crop of poor grass land, and land which has been allowed to go out of cultivation. It is expected that an increased acreage of approximately 2,000 acres will be obtained."

"It was decided to issue a warning that unless marked improvement took place in cultivation before 1st July . . . the Committee would take steps to terminate the tenancy."

"The Commissioner advised that the Committee should formally enter on the land and arrange for the sowing of the crop."

"Orders to cultivate were made in six cases; and in two cases Local Authorities were authorised to take over land for allotments. The Committee have taken possession of about 25 acres of land and let it at 1*s*. an acre for two years. They have ordered that 75 acres be bare-fallowed; and have come to an agreement with the agent of one estate that he should terminate a tenancy forthwith and secure another tenant. In another case they have taken possession of the arable land and horses and left the rest to the present occupant. One District Committee is about to cultivate 25 acres of building land for corn. An order has been made for the mole-draining of three fields on one farm."

"The Executive Committee have dealt with a great number of cases of badly cultivated farms. In some cases a letter to the landlord or his agent has produced sufficient results, in others a notice served on the occupier has had good effects, in others the tenant has proved incapable of improving his cultivation, and the arable land is taken over by the Committee. In the case of building land which is derelict the Committee is most energetic in getting it cultivated to the best advantage."

"Action was taken in the case of a farm of 224 acres . . . in an exceedingly bad state . . . It has been arranged to terminate the tenancy and the tenant who was coming in at Michaelmas will come in now."

"The Committee have a case of an 800 acre farm practically derelict for several years, and now badly infested with rabbits. It is hoped that this farm can be restored in part during the summer months for wheat sowing in autumn, but the first essential is to clear the land of vermin. The owner has been required to get this done."

"Another case was considered of an area of 40 acres which is water-logged. It was decided to serve notice upon the owner to drain in order to increase the area under cultivation for 1918."

"The Committees are taking energetic, and in some cases drastic, measures under the Order. They have given peremptory orders in several cases for additional land to be ploughed, ranging from 5 to 50 acres in each case. They have also authorised several tenants to plough where owners objected to the pastures being broken up ; they have also directed some tenants to apply sulphate of ammonia to some of their crops and to sow certain acreages of wheat for next year."

"The Executive Officer has arranged with the tenants, and is directing the proper cultivation of these two farms by them."

"A young farmer of military age was reported as cultivating his farm badly. The Executive Committee decided to ask the agent of the estate to arrange for the proper cultivation of the farm by another tenant, and as soon as this was done to call the attention of the Military Authorities to the fact that this man is available for service."

A few Committees seem reluctant to use their powers even in clear cases But on the whole, when cultivation is defective tenant farmers, owning farmers and large landowners are all being dealt with faithfully. In the case of owners, whether working farmers or otherwise, there is no question of summarily terminating a tenancy. But enough powers remain. An Order to cultivate properly can be made, and, if necessary, enforced Thus in one county a large landowner who refused to cultivate some land in hand in accordance with the Committee's advice, was sharply brought to terms by an intimation that the Committee would prosecute " unless he complied with their Instructions " forthwith.

Even when landowners are not themselves farming any land, Committees should not overlook the possibility that they can help by putting pressure on unsatisfactory tenants In many cases improvement on badly cultivated farms has been secured by the help of the landowner or his agent. In others, for one reason or other, it has been found that on a whole estate the standard of cultivation is below the average When this is so, the cause should be looked into, and the owner be made to remedy it, whether it be due to mistaken kindness to old and inefficient tenants, to bad estate management, or to excess of rabbits or hares.

In conclusion one more instance where the reserve powers of the Order proved useful may be mentioned

" The survey revealed the facts that the farm was insufficiently cultivated , that the tenant was an old man who was giving up his farm at Lady Day, 1918 , that he had sold his stock, including his horses and implements , and that he proposed to let the grass land As he was feeble, the Executive were doubtful whether they could press him to cultivate an additional acreage this spring, as such an Order would have entailed his buying horses and implements to carry it out. . In reply to a letter to the Agent, the Committee were informed that he could give no help in the matter as there was no incoming tenant in view " The Executive thereupon instructed the agent to terminate the tenancy, and ordered him to cultivate the land required The Commissioner also wrote a personal letter to the Agent Within a week the tenancy was terminated by mutual agreement and the land re-let to an excellent farmer who will stock and cultivate it properly and put in the additional area of spring corn asked for by the Committee The Commissioner adds " This would certainly not have happened but for the ' Lands Cultivation Order.' "

THE PROFITABLE UTILISATION OF SURPLUS MILK.

AN APPEAL FOR CHEESE-MAKING.

THE President of the Board of Agriculture and Fisheries desires to call the attention of farmers and cowkeepers to the national importance of the maintenance and economical utilisation of milk supplies.

The primary object of all milk-producers must be the production of adequate supplies for human consumption, particularly for the feeding of children and invalids. Milk is most economically utilised when it is consumed as whole milk.

The whole supply cannot be utilised in this way, since some of the milk must be reserved for purposes of calf-rearing. The amount used for this purpose need not be very great, since it is now well known that calves can be reared successfully from about the third week of life without milk of any kind (see Leaflet No. 142 and Technical Bulletin No. 8, Series C).

There are many farms, however, from which it is not possible to dispose of the whole of the milk for direct human consumption, and alternative methods for its disposal have to be adopted. Again, there are dairies in which at times the supplies of milk exceed the demands for human consumption as such. In all such cases it must be the endeavour of the farmer or dairy manager to convert this surplus milk, however small in quantity, into marketable forms of human food. Various alternative methods can be adopted for this purpose.

1. **Feeding to Stock for Production of Veal or Pork.**—This method is only mentioned in order that it may be condemned outright as probably the most wasteful of all methods. So little human food is produced in this way in proportion to the milk consumed that the practice cannot be too strongly deprecated even in normal times, and in these days it must be quite ruled out.

2. **Manufacture of Condensed or Dried Milk.**—A second alternative is to convert the milk into the concentrated form of *condensed milk*, or, better still, *dried milk*. In these forms the whole of the nutriment of the milk is rendered available for human consumption, but their preparation requires special and complicated machinery such as only a factory can provide.

3. **Butter-making.**—A third method of utilising surplus milk is to convert it into butter. In this way the milk is separated into two products, butter and skim (or separated) milk, both suitable and valuable foods for human consumption. The food value of the milk is about equally divided in amount between the two products, but whereas the butter contains practically only fat from the milk, the skim or separated milk contains the muscle and bone-forming ingredients, along with a small proportion of the fat. Where *both* products can be transmitted direct to the consumer there is very little waste involved in butter-making, but where, as is commonly the case, only the butter can be so transmitted the economy of the process is very different, since not only does the consumer of the butter receive barely one-half of the food-value of the original milk, but he misses some of the most valuable ingredients. In such cases the skim milk is commonly fed to stock and yields eventually only a fraction of its nutriment in the form of meat.

Some realisation of its food value is secured if the skim milk be converted into *skim milk cheese*, but such cheese rarely commands a satisfactory market and cannot be generally recommended. Information on this subject is given in Technical Bulletin No. 6, Series C.

4. **Cheese-making.**—The fourth method of utilising surplus milk is by its direct conversion to *cheese*.

When milk is converted into cheese a compact, durable, marketable product is obtained containing fully two-thirds of the nutriment of the milk and including not only the bulk of the fat but also the greater part of the muscle and bone-forming ingredients. Little more than the sugar of the milk is left in the whey. Compared with butter-making, therefore, cheese-making not only effects a greater recovery of the food-ingredients of the milk, but gives a good food which will keep longer and is much better adapted to meet the varied needs of the body than butter. The shrewd farmer will also bear in mind that butter is subject to the competition of an excellent substitute in the form of margarine, and that with the enormous impetus given to the consumption of the latter it will be increasingly difficult after the War to secure a margin of profit in butter-making.

The imports of cheese into Great Britain before the War amounted year after year to fully 120,000 tons, so that an immense market is obviously open to the British cheese-maker, and a large, permanent and remunerative extension of the industry is possible.

In view of these various considerations, therefore, every farmer or dairy manager is urged to make cheese from all the milk which is not indispensable for calf-rearing or cannot be disposed of for direct human consumption.

With a view to securing a rapid extension of cheese-making, the Board have taken steps to augment the supply of cheese-making apparatus available, and most County Education Authorities have now made special provision for instruction in cheese-making. Farmers wishing for advice and guidance, or for the services of an instructress, should, therefore, make applications to their County Education Authorities.

Very small quantities of milk can be made into cheese, but the kind of cheese which can be most profitably undertaken will depend on the amount of milk available and the local markets. For guidance in this matter and more detailed information on the manufacture of cheese from whole milk, reference should be made to Special Leaflet No. 41, and Leaflets Nos. 179 and 231.

Use of Whey.—In order to complete the case for cheese-making it is necessary to deal with the utilisation of the whey which is obtained as a by-product. The farmer who contemplates the substitution of cheese-making for butter-making will doubtless feel some anxiety as to how his calf-rearing is likely to be affected by the loss of the skim (or separated) milk which the butter-making leaves at his disposal. Since the cheese removes more of the nutriment of the original milk than butter does, the whey must be correspondingly inferior in feeding value to the skim milk. There is a common tendency, however, to over-rate the necessity of skim (or separated) milk for calf-rearing and to underrate the nutritive value of whey.

In cheese-making districts farmers have found it possible to rear satisfactory calves by beginning with whole milk for two or three weeks only and then gradually replacing it by a mixture of whey and suitable meals. The replacement may be completed within three weeks (*i.e.* by the age of six weeks), by which time the calf will take 1 to 1½ gal. of whey per day.

With regard to the meals required to supplement whey, good results have been obtained with (*a*) a mixture composed of one-third fish meal and two-thirds oatmeal (by weight); and (*b*) with palm-nut meal. It should be remembered, however, that in the national interest the use of oats (and also of maize, beans and peas) for stock feeding should be restricted within the narrowest possible limits.

When the mixture of fishmeal and oatmeal is used, it is best fed as a porridge made with boiling water, and it is suggested that a start should be made to feed this porridge when the calf has attained the age of three weeks by introducing a little of it into the pail before the calf has quite finished its feed of milk.

From this time onwards the amount of porridge given should be daily increased, accompanied at the same time by a corresponding decrease in the quantity of milk allowed, and the gradual introduction of a daily feed of fresh whey, so that by the time the calf is six weeks old the consumption of milk has been eliminated, and, in place thereof, each calf is receiving ½ lb. of mixed meal (in the form of porridge) and 1 gal. of whey per day. From six weeks onwards the quantities fed should be increased until 1 lb. of mixed meal and 1½ gal. of whey are consumed per head per day.

Good hay should be allowed *ad lib.*, and from the age of eight weeks linseed cake should be fed, commencing with about a ¼ lb. per head per day, this quantity being gradually increased until each calf gets ¾ lb. per day.

When palm-nut meal is used to supplement whey, the procedure advised is similar to that recommended in the case of the mixed meal, except that the palm-nut meal is not fed as a porridge. It is rather more difficult to get calves to take to palm-nut meal, but once the initial period has been overcome, no further difficulty as a rule arises. To begin with a little palm-nut meal should be introduced into the milk pail just before the calf has finished its feed. This start is made at the age of three weeks; in this way the calf will usually acquire a liking for meal, and from this time forward the meal may be fed dry.

The quantity of meal given daily should be gradually increased, more and more fresh whey should be fed, and the daily allowance of milk correspondingly decreased, until by the age of six weeks each calf is receiving 1 gal. of whey, ½ lb. of palm-nut meal, and no milk.

From this stage both the whey and the palm-nut meal should be gradually increased until 1½ gal. of whey and 1 lb. of meal are consumed per head per day.

The palm-nut meal should be fed dry immediately after the whey has been given. In this case also, good hay should be given *ad lib.*, and linseed cake, starting with ¼ lb. and finally reaching ¾ lb. per day, should be fed from the age of eight weeks.

Less satisfactory results were obtained with a mixture of equal weights of linseed meal, oatmeal, fine thirds, and pea meal. Very starchy materials, such as maize, should generally be avoided and preference given to foods, such as the above, which supply a fair quantity of oil along with the albuminoids.

Where the whey is not required for calf-rearing it can be profitably utilised for pig-feeding.

Conclusion.—To sum up the advantages of cheese-making as compared with butter-making: cheese-making gives direct to the human consumer a greater proportion and a greater variety of the food materials contained in the milk; it is usually more remunerative, and is likely to remain so in view of the rapidly increasing competition of margarine with butter; it gives a more durable product capable of prolonged storage; and the accompanying whey, though less nutritious than skim or separated milk, can still be used satisfactorily for the purposes of calf-rearing or pig-feeding.

Copies of the Leaflets referred to may be obtained free of all charge on application on an unstamped postcard to the Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1; and of the Bulletins on a similar application to the Food Production Department, 72, Victoria Street, London, S.W. 1.

Scheme for the Land Settlement of Ex-Service Men.

IT is proposed to establish four experimental Small Holdings Colonies in England and Wales of a total area not exceeding 6,000 acres for the land settlement of ex-Service men.

These colonies will be of three different types, viz. mixed farming, dairying and market-gardening.

Each colony will consist of a central farm, and of a number of small holdings, varying in extent according to soil and nature of cultivation, but usually not exceeding 50 acres.

The central farm will be under the management of a director, and will be equipped with machinery, implements, horses, etc., which will be let out on hire to settlers requiring them. It will, in the first instance, embrace the greater part if not the whole of the estate, and will be so laid out that portions of it may be taken away from time to time for increasing, within limits, the area of the small holdings as the growing ability and capital of their tenants justifies such addition.

Selected applicants who have had little or no previous experience will be given preliminary training on the central farm under the supervision of the director, receiving a fair living wage until such time as they are considered capable of taking up land for themselves. They will then be allotted land near their cottages, the area of which may subsequently be increased, as mentioned above, by taking land from the central farm.

Applicants who are able to satisfy the Board that they have the necessary capital and experience may be allowed to take up holdings without preliminary training.

Co-operative methods will be adopted for the purchase of requirements, and the consignment and disposal of produce.

It must be clearly understood that the Government do not propose to make direct advances of capital to ex-Service men desirous of taking up holdings, but it is hoped that industrious men, even if possessed of but little capital of their own, by starting as workers on the central farm and at the same time cultivating a small plot on their own account, may gradually be able to increase the area under their own control until they are able to support themselves entirely from this source.

Endeavours will be made to establish a system of co-operative credit in connection with each colony, to assist men of this class.

In the selection of settlers for the three colonies preference will be given, as between men of equal merit and qualifications, to those whose wives or sisters or daughters have, as the result of their employment on the land either before or during the War, acquired proficiency in milking or other farming operations.

1. **Particulars of Estates already Acquired.**—Under the scheme outlined above the following estates have already been acquired:—

(i.) *Crown Colony, Patrington.*—This estate comprises 2,363 acres of deep alluvial land capable of producing very heavy crops.

It is situated near Patrington in the East Riding of Yorks, about 15 miles distant from Hull. Vacant possession was obtained on 6th April, 1917.

When fully developed it will consist of a central farm of about 200 acres and 60 small holdings of "mixed farming" type averaging about 35 acres in extent. The equipment of each of the latter will include a comfortable cottage and the necessary buildings for carrying on the holding.

The Y.M.C.A. have promised to erect a hut for the use of the settlers on the Colony.

(ii.) *Crown Estate, Holbeach Marsh.*—This Estate consists of 1,000 acres near Holbeach, in the Holland, or Southern, Division of Lincolnshire.

The soil is a rich alluvium capable of producing very heavy crops.

Vacant possession will be obtained at 11th October, 1917.

This Colony when fully developed will consist of a central farm of about 200 acres and 80 small holdings of "market gardening" type, averaging about 10 acres in extent. The equipment of each of the latter will include a comfortable cottage and the necessary buildings for carrying on the holding.

2. **Particulars of Estates Proposed to be Acquired.**—The Board have under consideration the acquisition of a third English Colony, preferably in the Southern or Western counties of England, comprising from 1,100 to 1,200 acres, which it is expected will accommodate about 40 settlers.

Steps are also being taken to acquire an estate in Wales, consisting of about 1,500 acres, which it is anticipated will provide for the requirements of 60 small holders.

The sites of these two additional Colonies have not yet been selected.

Forms of application for holdings on these Colonies can be obtained from the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. 1.

Thistles in Corn.

FROM many quarters come reports of the abnormal quantity of thistles in our cornfields this year; and farmers would do well to give their prompt attention to this matter. Thistle spudding is work within the capacity of women and children; and the utmost possible use should be made of this source of labour. Farmers who have difficulty in getting the necessary help should at once write to the Secretary of the County Agricultural Executive Committee.

There are several reasons, personal and patriotic, why farmers should spud thistles in their corn as soon as possible. One of them is the special need of providing this year the maximum yield of grain—which cannot be done on thistle-infested land. Another is the necessity for saving labour later on, particularly in view of the likelihood of the farmer having to take a second crop of corn from the same field. Again, the stocks of hay in the country are small and may be smaller next winter and spring; and the supply of concentrated feeding stuffs is also short. Therefore more straw than usual will have to be used for the feeding of stock. Apart from all these points, there is the further circumstance that not only will much of the forthcoming hay crop be required for the Army, but much straw as well. It is obvious, therefore, that patriotism and enlightened self-interest both dictate the early and drastic destruction of thistles on our corn lands.

Notes on Feeding Stuffs for July: *From the Animal Nutrition Institute, Cambridge University.*

THESE notes give suggestions for the use of feeding stuffs for various kinds of live stock from the present time to the end of July. The prices, of course, refer to June, but in the suggestions an attempt is made to look ahead.

The trend of prices since May shows that the shortage of certain feeding stuffs is becoming more acute. For instance, on account of the milling and brewing Orders, millers' and brewers' offals are becoming very scarce, and the price still continues to rise. Beans and peas are also becoming dearer. Barley and oats, for which the price was fixed some time ago, remain as last month. Cakes have also remained fairly steady in price since the importation of oil seeds came under Government control.

Horses.—Since last month the Food Controller has taken in hand the question of oats for horses, and has issued an Order, The Horses (Rationing) Order of 11th May,* forbidding the use of oats and other cereal foods for horses not engaged in productive work, and limiting the amount of oats to be used for all classes of horses. The scarcity of oats is very great, and of the small supply an increasing proportion is required for human food. The following foods may be used to replace oats in the proportions stated :—

10 lb. oats may be replaced by 14 lb. bran, 10 lb. pollards, 12 lb. dried grains, 7 lb. maize, 9 lb. beans or peas, or 8 lb. linseed cake.

No single one of these foods should be used as a substitute for oats. It is much safer to use a mixture as suggested in past issues of these notes.

Farm horses at grass should not get more than the equivalent of 6 or 7 lb. of oats a day, and this quantity should be reduced when they are doing no work.

Idle horses should get no dry food.

Milking Cows.—Milking cows will now have been at grass long enough to be free from risk of scouring. For the present they should require no cake or food other than the grass. Owners should, however, watch the grass if the weather keeps dry, and if it shows signs of getting short, endeavour to supplement it with any green stuff which is available, or, in the last resort, with some kind of cake. The cheapest cake for this purpose at the present time is ground nut cake. Palm kernel cake, coconut cake, and linseed cake are also suitable, but rather dearer.

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* See p. 362.

Cattle for Beef Production.—Farmers should not ignore the fact that there is at present a popular demand for fixed prices for meat. This demand is becoming so insistent that fixed prices may be expected very soon: quite possibly before these notes are printed.

Prices are not likely to be fixed at the present high level: when the public asks for fixed prices, lower prices are

TABLE I.

Feeding Stuff.	Digestible Food Units.	Approximate Prices per ton at the end of May.					
		London.	Liverpool.	Hull.	Bristol.	Glasgow.	Leith.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Soya Bean Cake	122·3	—	—	—	—	—	—
Decorticated Cotton Cake	126·3	20 17 6	21 15 0	—	—	—	—
Decorticated Cotton Meal	126·3	—	—	—	—	—	—
American Linseed Cake	119·0	21 0 0	—	—	—	—	—
Indian Linseed Cake	123·1	—	21 5 0	—	—	21 15 0	21 5 0
Russian Linseed Cake	123·5	—	—	—	—	—	—
English Linseed Cake	120·1	21 15 0	21 10 0	20 0 0	—	22 0 0	21 12 6
Bombay Cotton Cake	65·3	Nominal.	16 10 0	—	—	—	—
Egyptian Cotton Cake	71·9	16 12 6	17 5 0	15 10 0	—	16 10 0	16 5 0
Coconut Cake	102·6	*17 0 0	—	—	—	—	—
Palm Kernel Cake	96·1	16 10 0	16 10 0	14 15 0	—	17 15 0	‖16 15 0
Palm Kernel Meal (extracted)	92·5	—	—	—	—	—	—
Ground-nut Cake	145·2	18 0 0	—	—	—	—	—
English Beans	99·5	*a* 19 7 4 *b* 18 19 0	21 9 4	20 8 5	—	—	—
Bean Meal	99·5	—	—	—	—	24 10 0	—
Chinese Beans	101·1	25 13 4	—	—	—	—	—
English Maple Peas	97·2	22 4 5	—	26 13 4	—	—	—
English Dun Peas	97·2	20 0 0	—	24 8 10	—	—	—
Calcutta White Peas	97·5	—	—	—	—	—	—
Karachi White Peas	97·5	27 15 6	—	—	—	—	—
American Maize	93·8	15 17 4	—	—	—	—	21 10 0
Argentine Maize	94·2	17 10 0	—	—	19 16 8		
Maize Meal	86·5	Nominal	—	18 15 0	—	—	22 0 0
Maize Gluten Feed	121·6	19 0 0	19 5 0	—	19 0 0	—	—
Maize Germ Meal	99·2	18 10 0	19 17 6	18 15 0	19 10 0	—	—
English Feeding Barley	83·0	[3]18 4 0 [4]18 1 0 [5]19 12 0	—	18 9 6	—	—	—
English Oats	75·4	[3]19 15 0 [4]18 7 9 [5]23 6 8	—	19 15 0	21 10 0	—	19 15 0
Argentine Oats	75·4	23 19 0	—	—	—		
Malt Culms	69·9	13 0 0	—	14 0 0	—	15 0 0	15 10 0
Brewers' Grains (dried)	84·5	[1]16 15 0 [2]16 10 0	—	13 0 0	—	—	—
Brewers' Grains (wet)	21·1	[1] 2 13 0 [2] 2 10 0	—	2 0 0	—	—	—
Distillers' Grains (English)	101·2	17 10 0	—	—	—	—	15 10 0
Distillers' Grains (French)	101·2	17 10 0					
Distillers' Mixed Grains (wet)	20·0	—	—	—	—	—	—
Egyptian Rice Meal	78·7	Nominal.	—	—	—	—	—
Burmese Rice Meal	78·7	Nominal.	—	—	—	—	—
Rice Bran	78·7	—	—	—	—	—	—
Wheat Middlings (coarse)	92·0	15 0 0	—	14 10 0	—	16 15 0	15 5 0
Wheat Sharps	92·0	15 10 0	15 15 0	14 10 0	15 10 0	15 10 0	14 10 0
Wheat Pollards	87·0	—	14 15 0	—	—	—	—
Wheat Bran	77·5	13 0 0	—	14 0 0	13 10 0	15 10 0	14 0 0
Wheat Bran (broad)	79·9	14 0 0	15 0 0	15 15 0	14 5 0	16 0 0	15 0 0
Feeding Treacle	60·0	19 0 0	21 0 0	—	—	—	23 0 0
Linseed	153·5	30 0 0	§40 0 0	‡33 0 0	35 0 0	—	32 10 0
Linseed Oil	250·0	[6]58 0 0 [7]61 0 0 [8]63 0 0	†60 0 0	53 10 0	—	—	—
Egyptian Cotton Seed	108·6	19 0 0	—	19 0 0	—	—	—
Bombay Cotton Seed	99·6	—	—	—	—	—	—
Cotton Seed Oil	250·0	—	†73 0 0	—	—	—	—
Fish Meal	145·0	—	—	—	—	—	16 0 0

Singalese Fine, £18 12s. 6d. per ton. † In barrels. ‡ Feeding § Cleaned. ‖ Carriage paid to any station.
[1] Ale. [2] Porter. [3] Government. [4] Average. [5] Permitted. [6] Raw.
[7] Boiled. [8] Refined. *a* Spring. *b* Winter.

desired. Lower prices for fat cattle may therefore be expected, and the farmer should shape his policy accordingly and endeavour to make the best possible use of his grass so as to be in a position to clear out his cattle without loss, even at a lower price than he calculated on when he bought his stores.

Out of every lot of stores put on grass there will be good doers, average animals and bad doers. The good doers should be marketed for slaughter as soon as they are anything like fit. The average animals may then be pushed on with a small ration of cake: 3–4 lb. per head per day of ground nut, coconut, palm kernel or linseed cake. No attempt should be made to make any cattle prime fat; they should be sold for slaughter as soon as they can possibly be killed and others put on the grass in their place.

There is much misapprehension on this point, and some explanation is necessary. Farmers generally believe that the last stages of fattening are the most profitable to them. From the money point of view this may have been correct, for when prices had free play, the last month or six weeks may have put 10*s*. per cwt. live weight on to the price the butcher will pay for the animal, which would mean an increase of £5 in the selling price per head. This, of course, would be most profitable, for it works out at something like £1 per week for keep on grass, which does not cost more than about half-a-crown on the average.

With the fixed prices which are likely to come, however, all this is changed. It is not likely that the prices which may be adopted will allow anything extra for animals which are prime fat over and above the price fixed for average animals. Consequently the last month or six weeks will not increase the selling price per cwt. live weight, and the return for the last six weeks' keep will be the selling price of the increased live weight only. Thus if an animal puts on 5 lb. per week for the last six weeks, his selling price will increase by the price of 30 lb. of live weight at the fixed price. Suppose this is 8*d*. per lb. live weight, then the last six weeks' keep gives a return of £1 This might just pay, but it would not do so if the animal only put on 3 or 4 lb. per week instead of 5 lb., and this might easily happen.

Perhaps the following figures may make the situation clearer:—

Some years ago a long and careful series of feeding trials were carried out by the Norfolk Chamber of Agricul[illegible]. In these trials the animals were fed on roots, straw, and cake for six months. The average live weight increases per head per week for over 100 animals were :—

1st month.	*2nd month.*	*3rd month.*	*4th month.*	*5th month.*	*6th month.*
17½ lb.	17½ lb.	17½ lb.	7 lb.	3½ lb.	1¾ lb.

For the first three months the rate of increase in live weight was over a stone a week. For the fourth month it fell to 7 lb. per week, for the fifth to 3½ lb. per week, and for the sixth to almost nothing: and this in spite of the fact that the cake ration was increased during the latter months to 10 lb. per head per day.

TABLE II.

LONDON. PRICES PER FOOD UNIT.

	s.	*d.*		*s.*	*d.*
Brewers' grains (wet) ..	2	5¼	English beans, spring ..	3	10½
Ground nut cake ..	2	5¾	Linseed	3	11
Coconut cake—Singalese fine	3	1½	Brewers' grains (dried) ..	3	11¼
Maize gluten feed ..	3	1½	English dun peas ..	4	1½
Wheat middlings (coarse)	3	2	English feeding barley (average)	4	4¼
Decorticated cotton cake	3	3¼	English feeding barley (Government) ..	4	4½
Cocoanut cake—London made	3	3¾	English maple peas ..	4	7
Wheat bran	3	4¼	Egyptian cotton cake ..	4	7½
American maize	3	4½	Linseed oil (raw)	4	7¾
Wheat sharps	3	5	English feeding barley (permitted)	4	8¾
Palm nut cake	3	5¼	Linseed oil (boiled) ..	4	10½
Distillers' grains (English)	3	5½	English oats (average) ..	4	10½
Distillers' grains (French)	3	5½	Linseed oil (refined) ..	5	0½
Wheat bran (broad) ..	3	6	Chinese beans	5	1
Cotton seed	3	6	English oats (Government)	5	2¾
American linseed cake ..	3	6¼	Karachi white peas ..	5	8½
English linseed cake ..	3	7½	English oats (permitted)	6	2¼
Argentine maize ..	3	8½	Feeding treacle	6	3¾
Maize germ meal ..	3	8¾	Argentine oats	6	4
Malt culms	3	8¾			
English beans, winter ..	3	9½			

TABLE III.

LIVERPOOL. PRICES PER FOOD UNIT.

	s.	*d.*		*s.*	*d.*
Wheat pollards	3	0¾	Maize germ meal ..	4	0
Maize gluten feed ..	3	2¼	English beans	4	3¾
Decorticated cotton cake	3	5¼	Egyptian cotton cake ..	4	9½
Palm nut cake	3	5¼	Linseed oil	4	9½
Indian linseed cake ..	3	5½	Bombay cotton cake ..	5	0½
Wheat sharps	3	5¾	Linseed	5	2½
English linseed cake ..	3	7	Cotton seed oil	5	10
Wheat bran (broad) ..	3	9¼	Feeding treacle	7	0

TABLE IV.

HULL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet) ..	1	10¾	Malt culms	4	0
Wheat middlings ..	3	0¾	English beans	4	1¼
Palm nut cake	3	1	Linseed	4	3½
Brewers' grains (dried)..	3	1	Linseed oil	4	3½
Wheat sharps	3	2½	Egyptian cotton cake ..	4	3¾
English linseed cake ..	3	4	Maize meal	4	4
Cotton seed	3	6	English feeding barley ..	4	5½
Wheat bran	3	7½	English dun peas ..	5	0
Maize germ meal ..	3	9¼	English oats	5	2¾
Wheat bran (broad) ..	3	11½	English maple peas ..	5	5¾

TABLE V.

BRISTOL. PRICES PER FOOD UNIT.

	s.	d		s.	d
Maize gluten feed ..	3	0½	Maize germ meal ..	3	11¼
Wheat sharps	3	5	Argentine maize.. ..	4	2½
Wheat bran	3	5¾	Linseed	4	6¾
Wheat bran (broad) ..	3	7	English oats	5	8½

TABLE VI.

AVERAGE PRICES PER FOOD UNIT.

LONDON, LIVERPOOL, HULL AND BRISTOL.

	s.	d.		s.	d.
Brewers' grains (wet) ..	2	3	Maize germ meal ..	3	10¼
Ground nut cake ..	2	5¾	Malt culms	3	10½
Wheat pollards	3	0¾	Argentine maize.. ..	3	11½
Maize gluten feed ..	3	1½	English beans	4	0
Wheat middlings (coarse)	3	1½	English feeding barley ..	4	2¾
Coconut cake	3	2½	Maize meal	4	4
Palm nut cake	3	4	Linseed	4	6
Decorticated cotton cake	3	4¼	English dun peas ..	4	6¾
American maize.. ..	3	4½	Egyptian cotton cake ..	4	7
Wheat sharps	3	4¾	Linseed oil	4	8¾
Indian linseed cake ..	3	5½	English maple peas ..	5	0¼
Distillers' grains (English)	3	5½	Bombay cotton cake ..	5	0½
Distillers' grains (French)	3	5½	Chinese beans	5	1
Wheat bran	3	5¾	English oats	5	5½
English linseed cake ..	3	6	Karachi white peas ..	5	8½
Cotton seed	3	6	Cotton seed oil	5	10
American linseed cake ..	3	6¼	Argentine oats	6	4
Brewers' grains (dried) ..	3	7¾	Feeding treacle	6	7¾
Wheat bran (broad) ..	3	8½			

TABLE VII.

GLASGOW. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	2½	Wheat bran	4	0
Wheat sharps	3	5¼	Wheat bran (broad) ..	4	0
Indian linseed cake ..	3	6½	Malt culms	4	3½
Wheat middlings ..	3	6½	Egyptian cotton cake ..	4	7¼
English linseed cake ..	3	8	Bean meal	4	11½
Palm kernel cake ..	3	8¼			

TABLE VIII.

LEITH. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	2½	Wheat bran (broad) ..	3	9
Distillery mixed grains	3	0¾	Linseed	4	3
Wheat middlings ..	3	2½	Malt culms	4	5¼
Wheat sharps	3	2½	Egyptian cotton cake ..	4	6¼
Palm kernel cake ..	3	5¾	Maize	4	6¾
Indian linseed cake ..	3	6½	Maize meal	5	1
English linseed cake ..	3	7	Oats	5	2¾
Wheat bran	3	7¼	Feeding treacle	7	8

TABLE IX.

AVERAGE PRICES PER FOOD UNIT.

GLASGOW AND LEITH.

	s.	d.		s.	d.
Fish meal	2	2½	Linseed	4	3
Distillery mixed grains	3	0¾	Malt culms	4	4¼
Wheat sharps	3	3¾	Egyptian cotton cake ..	4	6¾
Wheat middlings ..	3	4½	Maize	4	6¾
Indian linseed cake ..	3	6½	Bean meal	4	11½
Palm kernel cake ..	3	7	Maize meal	5	1
English linseed cake ..	3	7½	Oats	5	2¾
Wheat bran	3	9½	Feeding treacle	7	8
Wheat bran (broad) ..	3	10½			

Complete sets of figures, like the above, are not available for cattle feeding on grass, but Mr. C. B. Fisher has recorded that the daily rate of increase in live weight for the second two months' grazing is only half what it is for the first two months.

This accords quite well with the Norfolk figures, and leaves little room for doubt that cattle on grass make only small increases after three months' grazing. Taking the Norfolk figures and assuming a fixed price of, say, 9s. per stone live weight, then a store would give financial returns per week as below :—

		s.	*d.*
1st month, gaining 1¼ stone live weight per week	..	11	3
2nd ,, ,, 1¼ ,, ,, ,,	..	11	3
3rd ,, ,, 1¼ ,, ,, ,,	..	11	3
4th ,, ,, ½ ,, ,, ,,	..	4	6
5th ,, ,, ¼ ,, ,, ,,	..	2	3
6th ,, ,, ⅛ ,, ,, ,,	..	1	1⅛

In such circumstances it would pay best to sell for slaughter after 12 weeks, or at the very latest 16 weeks feeding, so as to put another animal on the grass which might give a return of 9*s.* per week, especially if helped with a little cake.

TABLE X.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Per cent. digestible.				
Name of Feeding Stuff.	Nutritive Ratio.	Protein.	Fat.	Carbo-hydrates and Fibre.	Starch equiv. per 100 lb.	Linseed Cake equiv. per 100 lb.
Foods rich in both Protein and Oil or Fat						
Ground nut cake	1 : 0·8	45·2	6·3	21·1	77·5	102
Soya bean cake	1 : 1·1	34·0	6·5	21·0	66·7	88
Decort. cotton cake ..	1 : 1·2	34·0	8·5	20·0	71·0	93
Linseed cake, Indian ..	1 : 1·9	27·8	9·3	30·1	77·1	101
Linseed cake, English ..	1 : 2·0	26·7	9·3	30·1	76·0	100
Cotton cake, Egyptian ..	1 : 2·1	15·5	5·3	20·0	40·0	53
Cotton cake, Bombay ..	1 : 2·5	13·1	4·4	21·5	37·6	49
Distillers' grains (English).. Distillers' grains (French)..	1 : 2·9	18·7	10·2	29·0	57·3	75
Maize gluten feed	1 : 3·0	20·4	8·8	48·4	87·4	115
Brewers' grains, dried ..	1 : 3·5	14·1	6·6	32·7	50·3	66
Coconut cake	1 : 3·8	16·3	8·2	41·4	76·5	101
Palm kernel cake	1 : 4·5	14·1	6·1	48·9	76·7	101
Linseed	1 : 5·9	18·1	34·7	20·1	119·2	157
Bombay cotton seed ..	1 : 6·6	11·0	16·8	30·1	77·5	102
Fairly rich in Protein, Rich in Oil.						
Maize germ meal	1 : 8·5	9·0	6·2	61·2	81·0	107
Rice meal	1 : 9·4	6·8	10·2	38·2	68·4	90
Rich in Protein, Poor in Oil.						
Fish meal	1 : 0·1	54·0	4·0	—	60·0	78
Peas, Calcutta white ..	1 : 2·1	23·3	1·1	45·9	66·9	88
Beans, English	1 : 2·6	19·3	1·2	48·2	67·0	88
Beans, Chinese	1 : 2·6	19·6	1·7	47·9	67·0	88
Peas, English maple ..	1 : 3·1	17·0	1·0	50·0	70·0	94
Palm-nut meal (extracted)	1 : 3·4	15·6	1·9	48·7	66·1	87
Brewers' grains wet ..	1 : 3·5	3·5	1·5	8·6	12·7	17
Malt culms	1 : 3·6	11·4	1·1	38·6	38·7	51
Cereals, Rich in Starch, not Rich in Protein or Oil.						
Barley, feeding	1 : 8·0	8·0	2·1	57·8	67·9	89
Oats, English	1 : 8·0	7·2	4·0	47·4	59·7	79
Oats, Argentine	1 : 8·0	7·2	4·0	47·4	59·7	79
Maize, American	1 : 11·5	6·7	4·5	65·8	81·0	107
Maize, Argentine	1 : 11·3	6·8	4·5	65·8	83·5	110
Maize meal	1 : 13·0	5·5	3·5	63·7	77·8	102
Wheat middlings, fine ..	1 : 4·8	13·2	3·0	53·8	72·0	95
Wheat middlings, coarse or sharps	1 : 5·1	13·8	4·3	50·3	64·0	84
Wheat pollards	1 : 4·5	11·6	4·0	51·8	60·0	79
Wheat bran	1 : 4·7	11·3	3·0	45·0	48·7	65
Wheat bran, broad.. ..	1 : 4·7	11·3	3·0	45·4	48·1	63
Locust bean meal	1 : 22·1	4·0	0·7	69·2	71·4	94

Sheep.—Sheep should be managed on the same general principles as cattle, for the fixing of prices is likely to apply to mutton as well as beef. Consequently, it will not pay to make prime fat sheep, for they will fetch no more per cwt. live weight than animals which are only just fit to kill.

Pigs should be kept wherever possible on the outdoor system so that their food consists principally of green stuff with a small allowance of some kind of dry food fairly rich in protein, such as palm kernel or coconut cake or meal, or maize gluten feed. Full directions for this method of feeding are given in Technical Bulletin No. 9, Series C, issued by the Food Production Department, 72, Victoria Street, London, S.W. 1.

Action of the Beckenham Urban District Council under the Cultivation of Lands Order.

AS soon as the Cultivation of Lands Order was issued by the Board of Agriculture and Fisheries on 12th December, 1916, the powers it conferred on the Beckenham Local Authority were delegated to the Allotment Managers, who formed themselves into a committee and co-opted some members of the local Horticultural Society. An inspection of all the unoccupied land in the district was immediately undertaken, and a report was made by the end of the month. Though the subject was advertised in the local Press as early as 15th December, applications for allotments did not begin to come in until February, when they came in with a rush. With the least possible delay the plots were pegged out and plotted on the plans, a total number of 508 new allotments covering 33¼ acres being allocated. This new area brought the total number of allotments in the district up to 1,795, extending over an estimated total area of 120 acres.

The new land was let at 3*d*. a rod, except in one part of the district where the owners were averse to breaking up their pasture without heavy compensation. The difficulty was eventually solved by taking a field on a seven year's lease and adding it to the area under permanent allotments as distinct from the land held on temporary tenure under the Cultivation of Lands Order. This field was let at the rate of 6*d*. per rod for the first year and 1*s*. per rod for subsequent years.

Steps were also taken, with the consent of the owners, to secure the cultivation of the gardens of empty houses.

Out of 186 empty houses in the district only 7 gardens were found available, the remainder being either unsuitable for cultivation, cultivated by caretakers, or attached to houses occupied by soldiers. Regarding these 7 houses, the consent of the owner was refused in 3 cases, and given in 2 cases, while replies to applications were still being awaited in the remaining 2 cases.

Wherever the holders desired it, the Committee undertook to plough the land for them at cost price. Considerable advantage was taken of the offer and nearly 25 acres were ploughed at a cost of £34. Of the 25 acres, only 14 acres belonged to the new allotments. The Committee also undertook to obtain seed potatoes and fertilisers in bulk and retail them to the residents at cost price. The result was that over 13 tons of fertilisers and 33 tons of potatoes were supplied in 2,400 lots.

THE following Note has been communicated to the Board by the Agricultural Organisation Society:—

A Successful Farmers' Association.

The West Midland Farmers' Association, Ltd., was founded in 1902 with 16 members; it now has 691 members, and is an admirable illustration of the way in which the co-operative movement is surely, if slowly, developing in connection with British agriculture. In 1902 the sales of the Association were £536; in 1916, they were £103,107. In the first year of its existence the society paid 3*d*. in the £ as a bonus to members on their purchases; last year it paid 1*s*.—the amount of the bonus distributed in 1902 was £6; in 1916 £3,664. Although the benefits to the associated farmers are not confined to the monetary side, a financial condition such as that of the West Midland Farmers' Association indicates the very substantial advantages to be obtained by a system of co-operative, as distinct from individual, purchase of requirements. That farmers in the district are realising the benefits of collective trading is shown by the last year's increase of membership, which was 87. The year's profit available for disposal, including just under £1,000 brought forward from last year, is £6,400; the net profit shows an increase of more than £2,600, "due to favourable contracts being made on rising markets." The share capital issued is less than £900, as against a general reserve of £1,200, and a special reserve of

£200 for the purpose of making up the salaries of employees on military duty. The Association, which is affiliated to the Agricultural Organisation Society, is one of the best-managed farmers' societies in the country.

THE following Note has been communicated to the Board by the Agricultural Organisation Society :—

Co-operation among Fruit Growers.

There seems a strong possibility of a wide expansion of the co-operative movement among English fruit growers. The Cheltenham and District Market Gardeners and Fruit Growers' Association, one of the pioneers in co-operative activity of this kind, has for some years past been doing excellent work in the promotion of a higher standard of technical skill by means of weekly meetings and in other ways Latterly, the wastefulness of the system, or lack of system, by which the produce of the Association reaches the retailer has been forcibly brought home to the members. As many as a dozen carts belonging to different growers may be seen at times standing outside a single retail shop. The lack of economy that characterises this method of dealing need not be emphasised, but the shortage of man-power, horses, and so on, has made it all the more obvious. The Cheltenham Association has therefore decided to add the words "Co-operative" and "Limited" to its title, to take suitable premises, and to inaugurate its own central market where wholesaler and retailer may meet and do their business quickly and economically. They will work generally on the model of the Pershore Co-operative Fruit Market, Limited, which provides packages at a small hiring fee and insists upon honest packing and guaranteed weight, a fixed commission of 7½ per cent. being charged on the selling price. In due course the Cheltenham Association will also purchase collectively their seeds, fertilisers, and so on, and will pulp, can, or bottle the surplus produce. The scheme is adequately financed, and looks like developing into a very important undertaking The advantages will not be all on the side of the wholesaler, although he will be most directly affected. The consumer will benefit by the more businesslike arrangement and the consequent stabilising of prices, and an improvement in the quality and grading of home-grown fruit and vegetables. The Agricultural Organisation Society is assisting the Cheltenham Society in various ways

OFFICIAL NOTICES AND CIRCULARS.

Agriculture and Recruiting.

THE following Memorandum, dated 5th May, 1917, has been addressed by the Director-General of the Food Production Department of the Board to the Secretaries of the Agricultural Executive Committees and to the Representatives of the Board of Agriculture and Fisheries before the Appeal and Local Tribunals:—

1. As a result of the Deputation received by the Prime Minister on 2nd April, 1917, from the Federation of War Agricultural Committees in England and Wales, and of the agreement arrived at between the Army Council and the Federation, the whole question of Agriculture and Recruiting has been under consideration by the War Office and this Department. The enclosed Army Council Instruction* has accordingly been issued, and the Instruction, in conjunction with this Memorandum, must be regarded as cancelling previous arrangements of a general character with regard to Agriculture and Recruiting.

2. With reference to the Memorandum F.P. 10 of the 28th February last, this Department are of opinion from the reports which have been received from various parts of the country that the arrangement outlined in paragraph 3 of that Memorandum is not working satisfactorily.

3. As regards men employed in agriculture passed for general service who have been refused exemption by the Tribunals, the following procedure has, therefore, been settled between the Army Council and this Department, and should be adopted.

4. Where the man in question is employed on a farm, *not being the farmer himself or the manager of the holding*, and the Agricultural Representative appointed by the Executive Committee considers that if the man is taken for military service the labour on the farm will be unduly depleted, the Representative should bring the case at once to the notice of the Executive Committee, with a view to their arranging for the provision of a substitute, either from an agricultural company, by the transfer of a farm worker classified B or C as regards military service and employed on a farm where there is excess of labour, from the National Service Volunteers, or otherwise. At the same time, the Agricultural Representative should notify the Recruiting Officer concerned, or, if he is not aware which Recruiting Officer is concerned, he should notify the Officer Commanding the Recruiting Area (hereinafter referred to as the Area Commander) of his opinion and of the action taken. The Recruiting Officer or the Area Commander will then arrange for the man's Calling-Up Notice to be suspended to enable a substitute to be provided, but if the substitute is not provided within a period of three weeks from the date of the Representative's notification the man will be called up for service with the Colours.

5. If, however, *the man in question is the farmer or is, in effect, the manager of the holding*, and is required to maintain the production of food upon it, the Agricultural Representative should at once notify the Executive Committee, who, if they are satisfied that the man's presence on the farm is indispensable, should notify the Area Commander to this effect, who, if he agrees with the opinion of the Executive Committee, will give instructions for the Calling-Up Notice to be cancelled. If, however, the Area Commander does not agree with the opinion of the Executive Committee, he is required to submit full

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* Not here printed.

particulars of the case to the War Office, and in the meanwhile the Calling-Up Notice will be suspended.

6. It will be observed that as regards a man engaged whole time on a farm on farm work, for whom it is considered that a substitute is required, and it would not be reasonably possible for the Agricultural Executive Committee to provide one, an application to the Tribunal by the Military Representative for the withdrawal or variation of a certificate of exemption held by such a man will only be made after consultation with the Executive Committee or their Agricultural Representative. Similarly, application on behalf of a man for a certificate of exemption or for the renewal of a temporary certificate of exemption, will not be opposed by the Military Representative except after consultation with the Executive Committee or their Agricultural Representative.

7. The procedure outlined in the foregoing paragraphs does not throw upon the Executive Committees the duty of providing a substitute in a case in which the Tribunal decides that the man at present on the farm should be released for military service subject to a substitute being provided. They should, however, where practicable, co-operate in the provision of available substitutes.

8. The Committee's attention is specially drawn to paragraphs (4) and (5) of the Agreement embodied in paragraph 1 of the Army Council Instruction and to paragraphs 2 and 3 of the Instruction referring to those paragraphs of the Agreement.

The Army Council propose to arrange that *every Calling-up Notice* will have attached to it a form stating that if the recipient of the Calling-up Notice is an agriculturist not classified in Category A (fit for general service) whole time engaged on a farm on farm work, he should take the Notice to his employer and ask him to certify in the space provided on the form that the man is so engaged. The man should then return the form and the Calling-up Notice to the Recruiting Officer. The procedure to be followed subsequently by the Recruiting Officer and the Executive Committee is set out in paragraph 2 of the enclosed Army Council Instruction. If any case comes to the notice of the Executive Committee or the Board's Representatives in which the form above referred to was not attached to the Calling-up Notice sent out from a Recruiting Office, full particulars should be at once supplied to this Department.

9. It is desirable that the Executive Committee should make arrangements as soon as possible for the appointment of Representatives to cover the whole county to act as assistants to the Committee's Chief Representative, who is usually the Board's Representative before the Appeal Tribunal, and it is suggested that the services of the Board's Representatives before the Local Tribunals should be utilised, such Representatives to act as the local agents of the Executive Committee for the purpose of this work.

10. It would be desirable, as soon as the Executive Committee have made their arrangements with regard to the appointment of their Representatives, for the area Commander to be notified of the names and addresses of such Representatives, and of the Areas for which they act, even although the correspondence with the Area Commander will be usually couducted by the Executive Committee. At the same time this Department should be notified of the arrangements made by the Committee for dealing with this important work.

11. The above arrangements, which deal with men engaged whole time on a farm on farm work, do not embrace all men who are indispensable to the production of home-grown food. It must not, however, be assumed that men such as market gardeners, foremen in fruit or market gardens, thatchers, and men engaged with agricultural machinery, may not be equally important to the maintenance of the home-grown food supply. Although it is not possible, owing to the varying conditions of employment, for such men to be included in a general arrangement, yet this Department rely on the Tribunals giving careful and sympathetic consideration to any application for the exemption of men so employed, who are indispensable in their food-producing occupations. The Board's Representatives before the Tribunals should take care to see that the importance of such men being retained in their civil employment is clearly placed before the Tribunals.

ARTHUR LEE.

NOTE.—*Minimum Scale of Agricultural Labour usually known as the Bath Agreement.*

The following Scale has been agreed upon between the Army Council and the Board of Agriculture and Fisheries *as a general guide* for determining the number of men to be retained on farms, namely :—

One skilled able-bodied man or lad (wherever possible not of military age) for each of the following :—

- each team of horses required to cultivate the land ;
- every 20 cows in milk, when the assistance of women or boys is available ;
- every 50 head of stall or yard stock, when auxiliary feeding is resorted to and the assistance of women or boys is available ;
- every 200 sheep, exclusive of lambs, grazed on enclosed lands ;
- every 800 sheep running on mountain or hill pasture.

It is obvious that this Scale cannot be undeviatingly followed, owing to the variety of methods under which agriculture is practised in different parts of the country, *nor does it embrace all descriptions of men employed on the land* ; it is circulated merely with the intention of affording guidance as to the *minimum number of certain classes of men* who are required to *preserve* the farming industry.

THE following Circular, dated 7th May, 1917, has been addressed by the Director-General of the Food Production Department of the Board to Agricultural Executive Committees :—

Harvest Labour.

SIR,—I enclose a copy of a Scheme* drawn up by the Committee appointed by the Director-General of National Service for the supply of harvest labour by Public and Secondary School masters and boys, Ministers of Religion, Civil Servants and others. Your Committee will observe that the Scheme, which has Mr. Prothero's cordial support, includes the appointment of delegates from four important organisations to meet members of the Agricultural Executive Committees and National Service Commissioners and Sub-Commissioners, and form with them Advisory Committees for the country.

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* Printed below.

The Advisory Committee for your county will be summoned by the National Service Commissioner or Sub-Commissioner at an early date, and I should be glad, therefore, if your Committee will consider the Scheme without delay and appoint representatives to serve upon that Committee.

I am, etc.,
ARTHUR LEE,
Director-General.

National Service Department: Temporary Advisory Committees for Harvest.

General Explanation.—THE Director-General of National Service and the President of the Board of Agriculture have accepted the offer of the Cavendish Association to place its organisation at their disposal for the purpose of arranging harvest and other work on the land in conjunction with: The Public and Secondary Schools, Civil Servants, Clergy National Service Committee, Free Church Council, National Union of Teachers, Boy Scouts Associations, Church Lads Brigade, Cadet Corps.

A Central Harvest Committee has been formed by the National Service Department representative of these Organisations by which the general arrangements for the effectual working of the Scheme have been drawn up, and the Director-General has appointed the Cavendish Association to carry out these arrangements under the supervision of the Director of the Agricultural Section of the National Service Department.

In order to facilitate the arrangements, the Cavendish Association (representing the Public and Secondary Schools), the Bishop of the Diocese (representing the Church of England), the Free Church Federation (representing the Free Churches), and the National Union of Teachers (representing the Elementary School Teachers) are, at the invitation of the National Service Department, each appointing a delegate for each county to confer with the National Service Commissioners and Sub-Commissioners, and the Agricultural Executive Committees, as to the best means of obtaining employment for, and placing squads that will be formed in connection with, these Organisations.

The experience of the last two years has shown that this class of unskilled labour is of very real value. It is important, therefore, that the formation of squads in connection with these Organisations should be encouraged in every way possible. During the past two harvests, this type of labour has not been used to anything like the extent that it might have been, largely owing to the indefinite nature of the appeal made for it. It is difficult to get men and boys to defer their vacation arrangements until the last moment. Unless, therefore, definite demands for their assistance are put before them in good time, the services of many will be lost.

Many men connected with the Organisations referred to number amongst their friends the best type of farmers. Such men could be asked by the Advisory Committee to approach the farmers with whom they are personally acquainted; a definite demand for labour might thus be obtained at an early date, and the necessary squads arranged.

The Advisory Committee could also obtain the assistance, where it is needed, of men who are known to them in various parts of the county who would be willing to assist in conjunction with the Agricultural Sub-Commissioner in finding accommodation suitable for squads, making arrangements for catering, for meeting squads on arrival, and generally looking after them (the latter refers especially to squads of Public and Secondary School boys).

Constitution of Advisory Committees.—It is extremely important that there should be no overlapping of effort at this critical time. The National Service Commissioner, or Sub-Commissioner, in each county, in conjunction with the Agricultural Executive Committee, will therefore form, with the four delegates of the Organisations concerned, an Advisory Committee to be convened by the National Service Commissioner, or Sub-Commissioner.

The functions of the Advisory Sub-Committee will be to consider questions as to the demand for and supply of this special class of labour, and the following are the chief points that will be referred to them.

Demand.—To impress upon farmers through the existing Sub-Committees of the Agricultural Executive Committee and Representatives appointed by the Advisory Committee, the necessity for utilising the labour provided by the National Service Department under this Scheme, and to ascertain as soon as possible, *not later than 15th June*, the labour they wish to engage. Such demands to be sent by the Agricultural Executive Sub-Committee on the forms supplied for the purpose to the Sub-Commissioner in duplicate.

Supply.—*Supply of Local Labour.*—(*a*) To receive from Public and Secondary Schools in the district particulars of squads of boys available for work *in their own localities*, either in term time or holidays, together with the names and addresses of squad managers.

(*b*) To receive from Ministers of Religion, Elementary School Masters, and Civil Servants, residing in the county, applications for work, together with the names and addresses of squad managers.

Labour from Sources Outside the County.—(*a*) To receive from the Central Committee at St. Ermin's, London, the offer of such squads as are required to supply the demands which have not been met locally, together with the names and addresses of squad managers.

(*b*) To notify the Central Committee at St. Ermin's, London, of all demands, giving full particulars of accommodation available, locality of farms, etc., on the forms supplied for that purpose. Demands will be communicated to the co-operating Organisations.

The Allocation of Labour.—(*a*) To allocate with the approval of the Sub-Commissioner the offers of service received under the heading "Supply."

(*b*) To notify the Central Committee *at once* when demands for labour notified to headquarters, are fulfilled.

N.B.—The allocation of all squads other than local squads must be arranged through the Central Committee.

Accommodation and Catering.—To consider the best means of accommodating squads and arranging for same.

(*a*) *Large Squads* in central places, to serve several neighbouring farms, going to and fro by bicycle or other means, to be billeted in schools, institutes, barns, under canvas, village inns, country houses (occupied or unoccupied).

(*b*) *Small Squads* with farmers, and, where possible, with local residents.

N.B.—The formation of squads will be in the hands of the Organisations supplying them. Full particulars as to the kind of squads for which arrangements will have to be made will be sent to the Advisory Committee at an early date.

To assist in making arrangements for catering and, where possible, obtain the help of Boy Scouts, Church Lads Brigade and Cadets. Squads will be responsible for their own catering.

Distribution.—Immediately the allocation of a squad is decided upon the farmer will be notified. The name and address of the squad manager will be sent to him in order that final arrangements may be made.

The local representative will also be informed.

Finance.—*Wages.*—To settle the question of wages with the employers in the case of each squad, subject to the general scheme laid down by the National Service Department, *i.e.* the pay of adults to be at the current rate for the job on which they are employed; the pay of boys to be threepence or fourpence per hour. Cases of disagreement as to wages to be decided by the National Service Commissioner or Sub-Commissioner.

Clerical Expenses.—The National Service Department is prepared to reimburse the Advisory Committee for the clerical and travelling expenses necessary for the carrying out of this Scheme.

Sheep Shearers.

A MEMORANDUM, dated 14th May, 1917, issued by the Food Production Department of the Board to Agricultural Executive Committees, states that, at the request of the Board of Agriculture, the Military Authorities have instructed Commanding Officers that skilled sheep shearers not in Category "A," for whose services application is made, should be granted one month's agricultural furlough, if they can possibly be spared from their units. All applications should be forwarded through County Agricultural Executive Committees.

Organisation of Sub-Committees to the Agricultural Executive Committees.

THE following Circular Letter, dated 16th May, 1917, has been addressed by the Director-General of the Food Production Department of the Board to County Agricultural Executive Committees in England and Wales :—

SIR,—1. The programme of increasing largely the production of cereals for the harvest of 1918 will make great demands on the time and attention of the Executive Committees, and renders it necessary to develop the organisation and increase the staff of the Committees.

2. It has therefore been decided to ask Executive Committees to appoint Sub-Committees, each of which should be entrusted with a definite branch of the work, so as to relieve the Executive of the detailed work of carrying into effect the programme, leaving the Executive free to consider the more important matters of policy while exercising a general supervision of the work of the Sub-Committees. It will be necessary to retain in the hands of the Executive Committee as a whole the exercise of any of the powers conferred on it by the

Defence of the Realm Regulations, but much of the preliminary work of inquiry could be delegated to Sub-Committees.

3. Steps should be taken at once to set up the following Sub-Committees each of which might consist of not more than two members of the Executive together with other persons co-opted from outside. The chairman of the Executive and the Board's District Commissioner should be ex-officio members of all Sub-Committees.

4. *Labour Sub-Committee.*—In the first place it is essential that there should be a special Sub-Committee to deal with the all-important subject of labour. In many counties a Sub-Committee has already been appointed to deal with the distribution of soldier labour, but its functions should be extended to deal with matters relating to the supply, distribution, housing and wages of all forms of labour, including women, as well as questions affecting the retention of the existing labour on the land, the work of the Tribunals, substitution, etc. In view of the necessity of encouraging the employment of women, and particularly of those women who have been trained under the Board's scheme, the Organising Secretary of the Women's War Agricultural Committee should be co-opted as a member of the Labour Sub-Committee. It is highly important that the Labour Sub-Committee should give their active assistance to the Women's Committee, and if there is any difficulty in placing the women who are trained the Sub-Committee should use their influence with farmers to induce them to engage the women. The present and prospective shortage of man-power in all industries is so serious that dilution of labour is as essential in agriculture as in any other business, and if any farmers unreasonably decline to employ available women, the Sub-Committee might refuse to allot to them soldiers or other male labour until they agree to engage a proportion of women. The Labour Sub-Committee might deal also with the supply and distribution of Army or other horses and with any question that will arise under the Billeting of Civilians Bill. It will probably be found necessary to appoint a special officer for the work of this Committee, who should be called the Labour Officer, and who may be paid a salary not exceeding £250 a year if he gives his whole time to the work.

5. *Machinery Sub-Committee.*—A revised scheme for the operation of the Government tractors has been issued under which the Executive Committees are asked to undertake a much greater measure of responsibility for the working of the tractors than was the case under the original scheme which had to be improvised at short notice before the Executive Committees were sufficiently organised to deal with the matter. In view of the new duties entrusted to the Committees by the revised scheme, and of the volume of work involved in making arrangements for the ploughing up of the quota of grass land apportioned to each county, it will be essential to appoint a special Sub-Committee for the purpose. It should be called the Machinery Sub-Committee and should deal with the work of the tractors, the sets of steam tackle in the county, and should also be responsible for the organisation of all kinds of agricultural machinery, especially threshing machines. The Sub-Committee should consist of not more than two members of the Executive, together with the tractor representative and the steam tackle representative of the Board.

6. It will be essential that this Sub-Committee should have a special whole-time officer, who should be called the Machinery Officer. It

will be his duty, under the directions of the Sub-Committee, to inspect land in order to see that it is suitable for mechanical ploughing, to make the contracts with the farmers, to arrange with the farmers how the land should be ploughed, and to get them to mark out the fields and state the headlands required. He will also be responsible for planning the route of the tractors from field to field, so as to avoid road journeys as far as possible, and should advise the tractor representative of the Board how the tractors should get to the land to be ploughed. He should also arrange where the stores of paraffin, oil and petrol should be kept, and should supervise generally the ploughing undertaken by the tractors. It will be necessary, therefore, that this officer should be an agriculturist possessed of practical experience of mechanical cultivation. The Executive Committee should proceed at once to select this officer, and should submit his name with a statement of his qualifications to the Board for approval before he is definitely appointed. A salary not exceeding £250 a year may be offered for this post.

7. *Supplies Sub-Committee.*—The increased quantity of fertilisers, seeds and other agricultural requirements that will be needed in connection with the increase of the arable area makes it necessary that timely steps should be taken to secure their supply and distribution. A special Supplies Sub-Committee should therefore be appointed. It should consist of two members of the Executive Committee together with representatives of the principal dealers, merchants and agricultural co-operative trading societies in the county. The Sub-Committee should arrange with the traders concerned for adequate supplies of fertilisers, seeds, etc., to be available at approved prices for use when required, and should ensure that farmers, dealers and others take delivery of their probable requirements during the summer and early autumn. If orders are deferred until later in the year it may not be possible for them to be executed. The Sub-Committee should use their influence to ensure that all land in the county is adequately and properly manured, and should undertake any purchases needed for land on which the Executive Committee enter under the Cultivation of Lands Order. The Food Production Department will be prepared to give the Sub-Committee any advice and assistance in their power as to the supplies, prices, etc., of requirements. It may be necessary to appoint an officer to act as a whole-time clerk to this Sub-Committee and, if so, a salary not exceeding £3 a week may be offered for this post.

8. *Other Sub-Committees.*—Executive Committees may find it desirable to appoint other Sub-Committees to deal with such matters as finance, the survey (on which the District Valuer of the Land Valuation Department should be appointed), and other branches of the work, but it does not seem necessary at the present stage for the Department to issue any definite instructions on the subject.

9. *District Committees.*—The Board recognise that the work which will fall on the District Committees in connection with the programme for the harvest of 1918 will be very heavy, and that in some cases it may be necessary to provide for further expenditure in addition to the honoraria to the clerks which were sanctioned in the Department's Memorandum of the 26th March. The Board think that it is desirable that the engagement of clerical assistance for the District Committees should be kept under the control of the Executive Committees themselves, and those Committees are authorised to incur commitments for additional clerical assistance for District Committees up to an amount

not exceeding £200 a year in any one county without further reference to the Department. Committees should, however, bear in mind the paramount importance of strict economy, and should satisfy themselves in each case that the fullest possible use is made of the services of volunteers.

10. *General.*—In several counties the posts of Secretary and of Executive Officer of the Executive Committee are held by the same person. In view of the increasing burden of the duties entrusted to the Executive Committees the Board think that it is necessary that the offices referred to should be separated in all cases. The Secretary should be responsible for the minutes, correspondence and office work of the Committee, and the Executive Officer should be the principal technical outdoor officer of the Committee entrusted with carrying out inspections, etc., and generally supervising the cultivation of any land taken over by the Committee. It will be impossible for one man to perform effectively the duties of both posts, and Committees should therefore arrange as soon as possible to appoint a separate secretary if this has not already been done. The secretary of a Committee may be paid a salary not exceeding £250 a year if he gives his whole time to the work.

11. In some counties the post of Executive Officer is held by an officer of the County Council whose salary is less than £300 a year, which is the scale applicable in the case of Executive Officers appointed from outside. In these cases the Board will be prepared to consider proposals for some additional payment to the Executive Officer, in view of the increased burden of work placed upon him.

12. I am to add that the Board think that Executive Committees when increasing their staff should ascertain whether competent men cannot be obtained from the ranks of the Agricultural Companies. These companies often comprise a number of men who are not suited for work on the land but who have had useful clerical or business experience, and who might be of considerable assistance in the work of the Executive Committee.

I am, etc.,
ARTHUR LEE,
Director-General.

Constitution and Duties of District Sub-Committees.

THE following Circular, dated May, 1917, has been addressed by the Director-General of the Food Production Department of the Board to Agricultural Executive Committees in England and Wales:—

SIR,—The following suggestions are offered for the guidance of County Agricultural Executive Committees in constituting District Sub-Committees and in defining their duties:—

1. As a rule, it is desirable that the County Executive Committee should divide the county into convenient districts for the purpose of the increased production of food, which would in most cases correspond with the existing Rural Districts, and should appoint to each district a Sub-Committee of not less than four or more than seven members, having experience in agriculture, and willing to attend meetings regularly during the War. To each Sub-Committee should be appointed as secretary someone who will be able and willing to give a substantial

amount of time to the work of the post, and who is not already overburdened by other duties.

2. A district Sub-Committee should meet at least once a fortnight, and if possible once a week, on a different day from that on which the Rural District Council meets, so that those members who are on both bodies may be able to give their undivided attention to food production work.

3. It should keep minutes of its proceedings, and forward a report after each meeting to the County Executive Committee and to the Board of Agriculture's Commissioner for the district.

4. It should appoint one or more persons experienced in agriculture as its correspondents and representatives in each parish or convenient group of (usually not more than three) parishes in its district, and report the names of these Parish Correspondents to the County Executive Committee.

5. It should report to the County Executive Committee any land within its district which is from any cause not at present producing its full quota of food for the nation, suggest the action necessary to obtain the best possible output of food from the land, and assist the County Executive Committee in carrying out any measures which it may decide to take with that object.

6. It should report to the County Executive Committee any grass land which in its opinion ought to be ploughed up for the 1918 cropping.

7. It should report any special cases of labour shortage and should see that farmers needing labour are put in touch with any available source of supply, such as women, soldiers, etc. It should co-operate closely with other organisations for the supply of labour, such as the Women's War Agricultural Committee and the Agricultural Representative of the National Service Department.

8. It should assist farmers in obtaining, through the County Executive Committee, good seed and manures, spraying materials for potatoes, and, where necessary, the use of horses and implements.

9. It should do everything in its power to facilitate the working of any motor tractors and steam tackle available in the county, and make known to farmers the terms on which their use can be obtained.

10. It should call the attention of farmers to the facilities for obtaining credit from the banks through the County Committee under the scheme arranged by the Board.

11. It should help to organise measures for the destruction of rabbits, rats, rooks, sparrows and other pests, and use its influence with the local bodies which are authorised to spend money for this purpose.

12. It should report any difficulties in maintaining the food supply due to the land being detrimentally affected by the blocking of watercourses, or the holding-up of water by mill-dams and locks.

13. It should assist the provisions of land for allotments where needed, encourage the adoption of co-operative methods for the purchase of seed, manure, etc., and take steps to see that all existing allotments and gardens are fully cultivated.

14. It should employ its parish correspondents to obtain detailed information, and carry out measures decided upon by the County Executive Committee, and generally to keep it in close touch with individual farmers throughout its area.

15. It should keep the Board's District Commissioner and Sub-Commissioner informed of the dates of its meetings and where they are to be held, in order that they may have an opportunity of attending and advising on any question under discussion.

The County Executive Committee should keep each district Sub-Committee informed without delay of the general instructions issued by the Board, and of any action taken which affects the area under the charge of the Sub-Committee. While it must be borne in mind that the County Committee cannot delegate to a Sub-Committee the executive powers conferred on it by the Order, it should endeavour to keep each Sub-Committee fully occupied with work of a responsible character, and thus save itself from becoming overburdened by a mass of detail which can be better dealt with by men of local knowledge. The measure of success that will attend the work of the Executive Committees in stimulating the increased production of food depends very largely on the amount of work that is done by the District Committees, and unless Executive Committees can rely on obtaining effective and constant assistance from the District Committees, they cannot hope to bring home to the individual farmers of the county the urgent call for increased production, or to afford them the help that they may need in their difficulties.

I am, etc.,
ARTHUR LEE,
Director-General.

THE following Circular Letter, dated 2nd June, 1917, has been sent by the Food Production Department of the Board to the Chairmen of Agricultural Executive Committees :—

Breaking Up of Grass Land.

SIR,—With the object of securing that the policy of the Government in relation to the increase of the arable area should be carried out with the least possible friction, it is desirable to emphasise the great importance of obtaining as far as practicable the voluntary co-operation of landowners and farmers in the programme for the harvest of 1918. The Board believe that an appeal to the patriotism of all classes of agriculturists will produce such a satisfactory response that resort to the compulsory powers of the Committees will only be necessary in comparatively few instances.

It is of the utmost importance that there should be a careful selection of the grass land which should be ploughed, in order that owners and occupiers may feel confident that the requests of the Committees have been based on a careful consideration of all the facts of the case, including the vital need of maintaining the milk supply.

In order to secure this confidence the Board think it important that the composition of the Executive Committees should be fully representative of all the interests concerned. I would suggest, therefore, that your Committee should consider the advisability of asking the Board to appoint such additional members as would make it more fully representative of both the land-owning and the farming interests. The Board will be glad if you will submit the names of any additional members whom your Committee would wish to be appointed in this connection.

With regard to the arrangements which are being made for the survey of your county, it is desirable that an appeal should be made in the first instance to the landowners and farmers to meet the Committee in conference and to indicate the area of grass land which they are prepared to break up in the national interests, provided that the necessary assistance in the way of labour, horses or machinery will be supplied in due course. In several counties there have been such conferences with the agents of the principal estates who have supplied particulars of the properties under their management, and have indicated the land which might be broken up with advantage. These conferences have proved of great assistance to the work of the Committees, and it is suggested that they should be arranged in all counties.

If the total area of grassland which owners and occupiers are prepared to break up voluntarily falls far short of the quota allotted to your county, the Board think that the best course will be to engage professional surveyors, valuers, or land agents, who should be instructed to select, in co-operation with the practical farmers on the District Committees, such additional lands as, in their opinion should be ploughed up in order to complete the quota for the county.

The procedure adopted in some counties of issuing general directions that the whole or some specified proportion of the land which has been laid down since 1872 must be ploughed up is open to serious objection and is calculated to arouse opposition which should be avoided if possible. In order to meet the needs of the present emergency it may in some cases be preferable to break up land which was not arable in the seventies, and in any case indiscriminate directions which are not based on any inspection or survey of the land are likely to do more harm than good.

I am, etc.,
A. LEE,
Director-General.

THE following Notice has been issued by the Food Production Department of the Board :—

Dairy Cows and the Ploughing Up of Grass Land.

In some counties there seems to be an idea that dairy cows and other cattle can only be kept when large areas of permanent grassland are available. At a recent meeting of the Essex War Agricultural Committee, various estimates were given of the number of acres of grass land necessary for each cow when the produce of arable land was used to help with their keep. It was stated that two acres per cow were desirable. The Hon. E. G. Strutt said that he found one acre per cow quite enough. Mr. Currie, who farms for cow-keeping, thought three-quarters of an acre sufficient. These opinions of practical agriculturists show what can be done with arable land. It must not be forgotten that the total food production of arable farming may be about four times as much as that from the same area of permanent grass. By ploughing up grass, the same number of cows might be kept, and a large surplus of grain food for human consumption grown as well. Dairy farmers need not fear the new three million acres of plough land, when labour and horses and machinery are guaranteed them.

Breaking up Pastures for the Harvest of 1918.

THE following Circular Letter, dated May, 1917, has been addressed by the Director-General of the Food Production Department of the Board, to County Agricultural Executive Committees —

SIR,—1. The Prime Minister, in his speech on Friday last, confirmed his previous statement of the Government's agricultural policy, and announced the official programme of breaking up 3,000,000 acres of grass land for the harvest of 1918 This task will have to be taken in hand at the earliest moment practicable

2 For the last three months, strenuous efforts have been made in the face of unprecedented difficulties due to the weather and other causes, to increase production for the harvest of this year, but in the short time available it was impossible to attempt much more than to overtake the arrears of cultivation and to secure that the existing arable land should be cropped as fully as possible Thanks to the work of the Committees, and to the increased confidence felt by farmers as a result of the guaranteed prices for cereals, the outlook for the harvest of 1917 is far more promising than appeared possible earlier in the year In this connection the Government desires to express its appreciation of the invaluable services which have been rendered to the nation as a whole by the members and staff of Executive Committees and Sub-Committees, who have devoted so much time and labour to the task which was placed upon them

3 It is necessary now to invite Committees to consider the measures to be taken in regard to the harvest of 1918, and they will demand far greater efforts from Committees and from farmers generally than anything attempted hitherto

4 The Government recognises fully that the task of breaking up 3,000,000 acres of grass in England and Wales, can only be accomplished by means of a greatly increased supply of labour, of horses, and of machinery All these matters are engaging its attention and further communications on the subject will be sent to you as soon as possible Consideration is also being given to the necessity of securing adequate quantities of seed

5 In the meantime it is necessary to apportion to each county its proper share of the task Some preliminary figures were circulated at the Conference on the 18th ultimo, which were based on the assumption that each county should plough up three-quarters of the acreage which had gone down to grass since 1872 But since then the matter has been examined further, and a revised apportionment has been prepared, a copy of which is enclosed * In preparing this apportionment an attempt has been made to equalise so far as possible the task set to the different counties, as it is recognised that many of the grass counties could not return at once to the conditions of 1872 without sacrificing a considerable quantity of dairy stock, and also that some of the principal arable counties may reasonably be asked to plough more land than would restore the area of arable in 1872. Consideration has also been given to such factors as the number of dairy stock kept in each county in proportion to the area of permanent grass, the custom in certain counties of leaving down temporary leys for several years, the extent to which the quality of the land makes it specially

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* Printed above.

suitable for producing good crops of cereals; and a general review of the local conditions of each county.

6. The apportionment suggested in the enclosed statement represents the result of all these considerations. In some counties there may be exceptional difficulties which render some reduction of the apportionment necessary. If so, the Board will be ready to consider any representations on the subject which the Committee desire to make; but it must be borne in mind that any substantial reduction of the apportionments suggested will imperil the attainment of national security, and should therefore not be proposed except for imperative reasons.

7. It will be for the Executive Committees, with the assistance of their District Committees, to apportion the increased area to be ploughed to the various district and parishes and ultimately to each individual farm. For this purpose it will be necessary to obtain particulars of the cropping, etc., of each farm, and to make a complete survey of the county in order to see that the land to be ploughed is rightly selected. It is obviously desirable to avoid as far as possible the multiplication of returns, and the Board have decided that the best course is that the annual agricultural return which is collected from each occupier on the 4th June should be made compulsory, so that the information obtained may be available for the use of the Executive Committees. The Board propose to arrange for the tabulation in parish schedules of particulars from the returns of the cropping and livestock of every holding over 20 acres in England and over 10 acres in Wales, and these schedules will be sent to the Executive Committees as they are completed. It is hoped that schedules for some of the parishes will be available by the beginning of July, and that the tabulation will be completed soon after the end of that month. By this means Committees will have a record of the cropping and stock of every farm, which should be of great assistance to them in selecting the land which should be ploughed.

8. In the meantime, Committees should concentrate on the land which ought to be ploughed during May and June. They should also do everything in their power to bring home to farmers the urgent needs of the situation, and to convince them of the necessity in the present crisis of setting aside the ordinary traditions of husbandry in order to produce the quantity of food required for national security.

9. The first task of the Committees must be to put in hand a survey of their counties in order to select, in co-operation with the farmers, the land which should be ploughed for the harvest of 1918. The survey will require careful organisation and additional professional assistance will no doubt be necessary in most cases. In view of the volume of work to be performed the Board feel that it is reasonable to provide for the payment of such surveyors or valuers as may be employed for the purpose. Executive Committees are authorised, therefore, to engage paid assistance where necessary, and the Board suggest that the remuneration of any professional surveyors or valuers employed should be at rates not exceeding £3 3*s*. a day, together with out-of-pocket expenses. The patriotic offers of assistance made to the Board by the Surveyors' Institution, the Land Agents' Society, the Auctioneers' Institute and the Central Association of Tennant Right Valuers lead the Board to think that professional surveyors will be prepared to accept reduced fees for work of such urgent national importance. It

will be desirable that the professional surveyors should have associated with them the best practical farmers in each district, and the co-operation of the District Sub-Committees should be invited for this purpose

10 In selecting the land to be ploughed, Committees must constantly bear in mind that it will not be enough merely to secure that their quota of grass land is to be ploughed up The task is to grow enough food to render ourselves independent of imported supplies, and for this purpose the land to be ploughed must be such that it will produce at least average crops of corn and potatoes It will, therefore, not be sufficient merely to plough up the poor grass land Such land will not produce good crops without fertilisers, and the supply of fertilisers is necessarily limited It will, therefore, be necessary to plough up some of the good grass land This country possesses in the good grass land the only reserve of fertility in Europe, and in the present crisis we must make use of it to produce the food which the nation needs It will be necessary to retain sufficient grass to preserve the dairy stock, since the supply of milk must be maintained to the full; but in this connection every effort should be made to extend the system of arable dairying With regard to other stock it will, owing to shortage of shipping, be necessary in the near future for both the Army and the civil population to obtain a much larger proportion of their meat from home sources than has hitherto been the case, and for this reason, and also in view of the shortage of feeding stuffs, a large reduction of our flocks and herds will be essential in any event

11 The case, therefore, for a great increase of arable cultivation is overwhelming from all points of view, and Executive Committees should lose no time in bringing home to agriculturists the facts of the situation and in appealing for their whole-hearted co-operation in the national task It is the duty of the members of the Committee themselves, and of all the leading agriculturists in the counties, to set the example in the matter It is inevitable that there will be great difficulty in persuading many farmers to vary the system of farming to which they have been accustomed, and it is, therefore, of the first importance that the Committees should have behind them the active support of the best farming opinion in the counties It is the earnest desire of the Government that the agricultural revolution which is necessary should be a peaceful one, and they are confident that the appeal which is made to the farmers' patriotism, backed as it is by the guarantee against loss contained in the Corn Production Bill, will not be made in vain But it must be remembered that Committees have been invested with powers to enforce the task which is placed upon them, and in the last resort they must not hesitate to use those powers whenever necessary.

12 It is impracticable to deal in one letter with all the matters which arise in connection with the Food Production Programme for 1918, and it will be necessary to address further communications to the Committees on many points

In the meantime it is confidently hoped that Executive Committees and all classes of the agricultural community will not fail to respond to the call which is made to them in this time of national peril, and that they will address themselves without delay to the accomplishment of their arduous task.

I am, etc ,

ARTHUR LEE,

Director General.

ACREAGE of ARABLE LAND in each COUNTY in ENGLAND in 1872 and 1915 and the ACREAGE of GRASS LAND which should be ploughed up for the harvest of 1918.

County.	Arable Land.		Grass Land to be Ploughed.
	1872.	1915.	
	Acres.	Acres.	Acres.
Bedford	184,180	144,025	30,000
Berkshire	258,063	174,327	45,000
Buckingham	216,591	128,801	50,000
Cambridge	406,918	212,424	35,000
Isle of Ely		162,860	20,000
Chester	194,165	193,139	60,000
Cornwall	377,391	314,332	80,000
Cumberland	269,301	185,372	60,000
Derby	151,750	80,713	35,000
Devon	669,936	474,939	150,000
Dorset	239,927	158,705	55,000
Durham	214,895	139,739	45,000
Essex	640,016	507,034	85,000
Gloucester	352,095	221,540	85,000
Hampshire	536,709	357,402	90,000
Isle of Wight		27,625	10,000
Hereford	207,941	123,475	55,000
Hertford	243,969	198,959	35,000
Huntingdon	152,050	122,524	25,000
Kent	445,022	291,941	95,000
Lancaster	239,662	236,142	60,000
Leicester	181,278	96,590	60,000
Lincoln—			
Holland	1,050,602	178,477	30,000
Kesteven		266,531	50,000
Lindsey		549,103	90,000
London	—	2,213	—
Middlesex	40,011	24,065	5,000
Monmouth	91,722	32,649	30,000
Norfolk	840,148	780,687	95,000
Northampton	285,632	156,817	75,000
Soke of Peterborough		26,806	5,000
Northumberland	325,006	179,679	80,000
Nottingham	291,349	216,531	55,000
Oxford	277,519	198,465	65,000
Rutland	44,032	31,683	10,000
Salop	340,681	220,726	80,000
Somerset	296,868	158,218	90,000
Stafford	236,999	150,554	70,000
Suffolk East	619,028	327,392	30,000
,, West		236,784	20,000
Surrey	193,343	96,475	30,000
Sussex East	388,849	100,051	45,000
,, West		127,248	40,000
Warwick	247,936	138,625	60,000
Westmorland	54,336	35,199	15,000
Wiltshire	425,777	258,927	85,000
Worcester	214,375	121,255	40,000
York, East Riding	500,643	444,660	70,000
,, North ,,	418,495	319,819	80,000
,, West ,,	474,159	340,426	90,000
Total England	13,839,369	10,272,673	2,700,000

ACREAGE of ARABLE LAND in each COUNTY in WALES in 1872 and 1915 and the ACREAGE of GRASS LAND which should be ploughed up for the harvest of 1918.

County.	Arable Land.		Grass Land to be Ploughed.
	1872.	1915.	
	Acres.	Acres.	Acres.
Anglesey	76,389	57,027	18,000
Brecon	75,390	35,655	20,000
Cardigan	124,690	90,770	26,000
Carmarthen	133,597	73,884	50,000
Carnarvon	72,835	52,027	16,000
Denbigh	131,866	79,693	32,000
Flint	70,790	37,124	18,000
Glamorgan	95,575	45,728	30,000
Merioneth	37,054	27,390	12,000
Montgomery	110,811	67,115	34,000
Pembroke	122,729	89,805	30,000
Radnor	52,032	36,816	14,000
Total Wales	1,103,758	693,034	300,000
Total England and Wales	14,943,127	10,965,707	3,000,000

Compensation Claims.

THE following Circular, dated 1st May, 1917, has been addressed by the Director-General of the Food Production Department of the Board to Agricultural Executive Committees in England and Wales :—

SIR,—1. Claims for compensation of various kinds will arise in consequence of action taken by Agricultural Executive Committees in the exercise of the powers delegated to them under Regulation 2M. Such claims may for example be made when the Committee have taken possession of land under para. (1) (*a*) of that Regulation, or of machinery, plant, etc., under para. (1) (*b*), or when directions have been given to cultivate in a particular manner inconsistent with the contract of tenancy; there may be claims by the tenant for loss due to possession being taken of his land or of his stock and so on, or by the landlord for loss of rent or other matters. In short, claims of many kinds may be preferred, some of which may be admissible and others inadmissible, and it is not possible here to do more than instance subjects on which the claims received will probably be the most numerous. Arrangements have now been made with the Defence of the Realm (Losses) Commission for the procedure in dealing with these claims. It has not been found possible to obtain powers either for the Board of Agriculture or for the Agricultural Executive Committees to enter into agreements for payment where action is taken under Regulation 2M.

2. The Commission will only consider applications for compensation in respect of direct and substantial loss incurred and damage sustained by reason of interference with property or business through the exercise by the Crown of its rights and duties in Defence of the Realm, that is to say, for the present purpose, through the exercise by Agricul-

tural Executive Committees, on behalf of the Board of Agriculture, of the powers given by Regulation 2M. Such applications will only be dealt with by the Commission if made, in the first instance, to the Agricultural Executive Committee by whose action the interference has taken place, and if made on one of the forms prescribed by the Commission, a number of copies of which are sent herewith. Any person applying to the Executive Committee for compensation should be given one of these forms to fill up and return to the Committee. In the form a concise statement must be given by the applicant of the particulars and grounds of the application, setting out in the appropriate places the acts causing the alleged loss and damage and the amount and detailed items of the loss incurred and damage suffered, and of the payments applied for. In cases where stock, etc., have been taken over, it will be necessary for the applicant, in filling up the form, to furnish an inventory of the items for which he requires payment with the value stated against each item. Upon receipt of an application in this form, the Executive Committee should instruct a qualified surveyor or land-agent of local experience in whom they have confidence, to furnish them with a report, which, in addition to any general remarks, should deal specifically with each item of the claim. Where a surveyor has prepared a record of the state of any land at the time of entry by the Committee, the same individual should ordinarily be instructed to report on the application for compensation. On receipt of this report, it should be forwarded to this Department together with the original application. It will be convenient, where there are a number of items in the claim, that the report should be furnished in half-margin. The Committee, if they are unable to obtain the voluntary services of a surveyor or land-agent in any particular case, are at liberty to pay a reasonable fee for an examination of the claim and for the report.

3. On receipt of the application and report in this Department, the case will be examined by Mr. Edwin Savill, who will carry out the work of examination on behalf of the Department. The Defence of the Realm (Losses) Commission have authorised the Board of Agriculture to make a payment on account in each case, not exceeding 50 per cent., of the total sum approved by Mr. Savill after consideration of the report furnished by the local surveyor concerned.

4. The Commission have undertaken to make every endeavour to facilitate the work by disposing with all possible despatch of applications which are submitted to them in the manner above indicated. No claim can be paid in full until it has been examined and decided upon by the Commission itself. For this purpose the report of the local surveyor, together with Mr. Savill's report made after consideration thereof, will be furnished by the Board to the Commission. The Commission require the applicant to reply to any observations or objections made by this Department, or to any inquiries made by the Commission, within ten days after receipt of notice from the Commission; to attend the Commission either personally or by deputy if required by them, upon five days' notice; and to produce to the Commission upon request any book, document, register or record in his possession or power relating to the subject matter of the application. The determination of the Commission upon each application will be communicated to the applicant when it has been reported to the Treasury.

5. The above observations should be communicated to persons who apply to the Committee for compensation in order that they may be made aware of the procedure to be followed.

6. It is understood that the Commission do not object to sanctioning periodic payments to landlords or tenants in suitable cases; and this will be found useful in providing for loss of rent and so on. The making of claims by applicants, and the forwarding of them by Executive Committees according to the procedure above indicated, should not, therefore, be delayed, in any case where the Committee have taken possession of land, until their occupation has expired, but should be carried on simultaneously with the operations of the Committee in order to avoid hardship being caused to dispossessed landlords and tenants.

7. It is proposed from time to time to circulate, for the information of Committees and of surveyors or valuers employed by them, instructions for dealing with the claims to compensation in accordance with the decisions of the Defence of the Realm (Losses) Commission.

8. It should be noted that each application to the Royal Commission requires to be stamped by the applicant with the duty of 2*s.* 6*d.*, as being a statutory declaration.

I am, etc.,
ARTHUR LEE,
Director-General.

Drainage of Lands Order, 1917.

AN Order, dated 31st March, 1917, has been issued by which the Board of Agriculture and Fisheries are empowered :—

(*h*) where, in the opinion of the Board, any land is injured or is likely to be injured by any such neglect on the part of the proprietor or occupier of any other land in relation to the maintenance of banks or the cleansing of channels as is mentioned in section fourteen of the Land Drainage Act, 1847, and subject to, and after the expiration of seven days from, the service of such notice as is required by that section, to exercise such powers of executing all necessary works and recovering the expenses thereof as are by that section conferred on the proprietor or occupier of any land which is injured by any such neglect, and for any such purpose to enter on any land without any warrant or authority; and

(*i*) by notice served on the occupier or person in control of any dam, mill, lock, sluice, weir, or other obstruction of the flow of water in any river or stream, to require such occupier or person to keep open any mechanical appliance by which the flow of water is regulated during such times and in such manner as the Board, having regard to the use by such occupier or person of the obstruction and of the water thereby impounded, consider to be necessary or desirable for the prevention of floods or for the draining of land adjoining or near the river or stream.

The Order states further :—

1. The Body constituted by the Cultivation of Lands Order, 1917 (No. 3), for any county may exercise on behalf of the Board within the county any of the powers of the Board under the paragraphs (*h*) and (*i*) hereinbefore recited in the same manner as the powers which the said Body are by the said Order authorised to exercise.

2. Where any Notice is served under the powers contained in paragraph (1) hereinbefore recited such notice shall contain a provision to the following effect —

> This Notice shall take effect at the expiration of seven days from the date of service hereof, unless before such expiration notice of appeal to the Board of Agriculture and Fisheries is given in writing to the Secretary to the War Agricultural Executive Committee, and in the event of any such appeal this Notice shall take effect on such date (if and) as the Board shall determine after considering the appeal.

This Order applies only to England and Wales.

THE following Circular, dated 7th April, 1917, has been issued by the Director-General of the Food Production Department of the Board to War Agricultural Executive Committees in England and Wales

Drainage of Lands and Protection from Floods.

SIR,—1 The attention of this Department has been drawn to the difficulties which are placed in the way of maintaining the food supply of the country by the blocking of water-courses, and by the holding up of water in rivers and streams Powers to obviate these difficulties have been obtained by an addition to Regulation 2M of the Defence of the Realm Regulations, and are delegated to County Executive Committees by the Drainage of Lands Order, 1917, a copy of which is enclosed with this letter * The additions made to the Regulation for this purpose are set out in the Order

Maintenance of Banks and Cleansing of Channels—2 In many counties it has been found that the occupiers of land have neglected to maintain the banks or to cleanse the channels of drains streams and water courses lying in or forming the boundaries of, the lands occupied by them and that for this reason the channels fail to carry off the water and often flood the adjoining lands thus seriously interfering with the maintenance of the food supply A remedy exists for this state of things in the provisions of section 14 of the Land Drainage Act, 1847, but it is unsuited to the present emergency, and although sub-paragraph (*h*) which has been added to paragraph (1) of Regulation 2M proceeds upon the principle of these provisions they are considerably modified to meet the necessities of the present time Under this paragraph of the Regulations the Executive Committee, where they find that any land is injured or is likely to be injured by any such neglect as has been above described are empowered to serve a notice upon the occupier who has neglected to maintain the portion of the bank or to cleanse (by cutting the weeds or otherwise) the portion of the channel lying in, or adjoining his land and to call upon him to execute all necessary works for maintaining that portion of the bank, or for cleansing that portion of the channel The occupier will be given seven days in which to execute these works or satisfy the Committee that he will promptly do so If at the expiration of these seven days he has not done so, the Committee may enter upon his land and do the work themselves They may afterwards recover the cost in the manner provided by Section 14 of the Land Drainage Act, 1847, if the neglecting occupier fails to pay the sum apportioned upon him within one month after demand, they may apply to the Justices at Petty Sessions for a summons, and the Justices, on proof of the occupier's neglect to maintain the banks or to cleanse the channels, and of the injury caused or likely to be caused to any other land by such neglect, and of the expenses incurred by the County Committee in carrying out the work, may make an order for the payment of the expenses by the neglecting occupier, or of such proportion of the expenses as the Justices think he should pay The money ordered to be paid is recoverable under Section 6 of the Summary Jurisdiction Act, 1879

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* Printed above.

3 In exercising the powers above described, the Executive Committee should, wherever possible, give the required notices to the neglecting occupiers upon a line of banks or a line of channels at the same time, and if, at the expiration of the seven days named in the notice, the occupiers have not taken steps to carry out the works necessary, the Committee should arrange for doing the work themselves, and should then apportion the cost according to the length of the bank lying in or adjoining the land of the particular occupier, or to the frontage of his land upon the channel cleansed, and according to the work involved in each case It is hoped that by proceedings of this kind considerable improvements may be effected to the drainage of agricultural areas, and that substantial benefit may result to the food production of the country In many counties the Executive Committee will probably be able to utilise the services of agricultural companies or of conscientious objectors for the purposes indicated

4 A form of notice to occupiers is appended to this letter* , in the schedule to the notice should be specified, (1) the land to the occupier of which the notice is addressed, and (2) the banks or channels as the case may be, which the occupier is required to maintain or cleanse Any notice to be served in the exercise of these powers should be signed by the Chairman of the Executive Committee and will then be received in evidence without further proof, as provided in Article 11 of the Cultivation of Lands Order, 1917 (No 3) Para (11), which has been added to Regulation 2M, provides for the method of service , it is set out at the end of this letter.

5 *Obstructions of Streams and Rivers* —It has been found in certain cases that (apart from the cleansing of the channel) the holding up of an extensive quantity of water by obstructions such as mill-dams, locks and sluices, and so on, has had an injurious effect upon the drainage of agricultural land , and, accordingly, power has been given by sub paragraph (*i*), which has been added to paragraph (1) of Regulation 2M, to regulate the use of these obstructions, and has been delegated to County Executive Committees by the Drainage of Land Order, 1917 This power can be exercised only where action is found to be necessary or desirable for the prevention of floods or for the draining of land in the vicinity of the river or stream, and in exercising it regard must be had to the use by the millowner or navigation trustees or other person who occupies or controls the obstruction by which the water is impounded Executive Committees may by notice require any mechanical appliance, by which the flow of water through such an obstruction is regulated, to be kept open during such times, and in such manner as they think fit , but in deciding upon their requirements the Committee must take care that the mill-owners or navigation

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* Not here printed

trustees or other persons in question are allowed to retain a sufficient head of water to meet the necessities of their business, and at such times as their business requires. The notice is to allow a period of seven days before the requirements are to be carried out, in order to give the person to whom the notice is addressed time to make his arrangements, and in order to give him an opportunity of appealing to the Board against the requirements. This right of appeal has been reserved on account of the considerable interests which may, in certain cases, be involved. A form of notice is appended, and the notice must specify in its schedules the obstruction, and the river or stream, to which it applies, as well as the time, extent and manner in which the mechanical appliance in question is to be kept open; it may, in some cases, be found advisable to specify the number of feet of water which may be kept at a stated point above the obstruction. Any such notice should be authenticated and served in the manner indicated in para. (4) above.

In the case of salmon waters, no notice should be served requiring measures to be taken which would constitute a contravention of Section 26 of the Salmon Fishery Act, 1861, as amended by Section 53 of the Salmon Fishery Act, 1873.

6. *Service of Notices.*—The new paragraph (11) which has been added to Regulation 2M will apply, not only to the service of notices in the exercise of the powers conferred by the new paragraphs (*h*) and (*i*), but also to any other notices served under the powers conferred by Regulation 2M. It is as follows: "Any notice under this Regulation may be served on the person to whom it is to be given, either personally or by leaving it for him at his last known place of abode, or by sending it through the post in a registered letter addressed to him there."

I am, etc.,
ARTHUR LEE,
Director-General.

The Drainage of Lands Order, 1917 (No. 2).

AN Order, dated 7th May, 1917, has been issued by which the Board of Agriculture and Fisheries are empowered:—

(*j*) where in the opinion of the Board, any land is injured or likely to be injured by flooding or inadequate drainage which might be remedied wholly or partially by the exercise of powers which are conferred by any general or local Act, or by an award made under any Act, or by any Commission of Sewers, and which are not being exercised, or in the opinion of the Board are being insufficiently exercised, to exercise any such power and also any power conferred by any such Act or award or commission for defraying the expenses so incurred or for any purpose incidental to the exercise of any such power.

The Order states further:—

1. Paragraph 1 of the Drainage of Lands Order, 1917, shall apply as if the powers of the Board under the Paragraph (*j*) hereinbefore recited, were included in the powers which by Paragraph 1 of the Drainage of Lands Order, 1917, the Body constituted by the Cultivation of Lands Order, 1917, (No. 3) for any county are authorised to exercise on behalf of the Board within the county.

2. This Order applies only to England and Wales.

THE following Circular, dated May, 1917, has been issued by the Food Production Department of the Board, to Agricultural Executive Committees in England and Wales:—

Drainage of Lands and Protection from Floods.

SIR,—1. In the Circular Letter (F. P. 25) issued by this Department on the 7th April, 1917, the attention of Agricultural Executive Committees was invited to the powers delegated to them by the Drainage of Lands Order, 1917, for securing the maintenance of banks and cleansing of channels of drains, streams and watercourses. Further powers have now been conferred upon the Board by the addition of Paragraph (1) (*j*) to Regulation 2M, and have been delegated to Agricultural Executive Committees by the Drainage of Lands Order, 1917 (No. 2),* copies of which accompany this Circular.

2. In various parts of the country it is found that powers given to Commissioners of Sewers, Drainage Boards and other bodies and persons by Commissions of Sewers, by Inclosure and Land Drainage Acts and other General or Local Acts, and by Inclosure and Drainage Awards, have either been unused, or have not been used to sufficient purpose, and that for this reason areas of land have become waterlogged or liable to floods and cannot contribute sufficiently to the food supply of the country at the present juncture. Where, therefore, in the opinion of the Agricultural Executive Committee, any land is injured or likely to be injured by flooding or inadequate drainage which might be remedied wholly or partially by the exercise of the powers already existing for such a purpose, the Committee are now enabled, in cases where they think this is necessary, to exercise these powers in the place of the body or person empowered by any such Act, Award or Commission, to take measures for the drainage of any land within the country, or for its protection from floods. Any expenses incurred in taking action under these powers, may be defrayed by the Committee in the manner indicated by the Act, Award or Commission; where, for instance, this empowers the authority constituted under it to raise a rate on the lands benefited or to recover the expenses from the owners or occupiers of particular lands, the Committee will be able to levy such a rate, or to recover the expenses from such owners or occupiers.

3. In many cases Executive Committees will require funds with which to commence operations, even though the expenses may afterwards be recovered as indicated above. Application should, therefore, be made to this Department for an advance which will be sufficient to enable the Committee to commence any particular work, and to carry it on until they are able to levy or recover the expense incurred; and the sums ultimately levied or recovered should be credited to the Department. In making such applications, it will not be necessary to furnish detailed estimates of the expenditure on each individual work, and in order to avoid unnecessary delay the Department are prepared to consider immediately applications for imprests for specified sums, if particulars are given of the general nature of the work for which the advance is required.

4. It is desired that the powers now delegated to Agricultural Executive Committees should be exercised mainly with a view to securing combined action by the authorities already invested with drainage powers, and not for the purpose of superseding them by a central

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* Printed above.

administrative machinery, and it should generally be possible for the Committee to arrange for considerable improvement of the present position without any actual exercise of the statutory powers which the Regulation and Order enables them to exercise.

I am, etc.,
ARTHUR LEE,
Director-General.

AN Order, dated 11th May, 1917, was issued by the Food Controller to the effect that:—

Horses (Rationing) Order, 1917.

1. Except under the authority of the Food Controller no persons shall feed or permit to be fed any horse with cereal foodstuffs in contravention of this Order.

2. This Order shall not apply to horses falling within the classes mentioned in the first Schedule.

3. (*a*) Horses falling within the classes mentioned in the second and third Schedules may not on any day be fed with more than the quantity of cereal foodstuffs prescribed for such horses.

(*b*) The quantity of oats which may be fed on any one day is prescribed in the Schedules, but maize, beans or peas may be used, and if so used they shall be deemed to be the equivalent of oats in the following proportions:—

7 lb. Maize = 10 lb. oats.
9 ,, Beans = 10 ,, ,,
9 ,, Peas = 10 ,, ,,

No other cereal foodstuffs may be used, except as specified in Clause 5 of this Order.

4. Horses falling within the classes mentioned in the fourth Schedule may not be fed with any cereal foodstuffs except as specified in Clause 5 of this Order.

5. No restriction is placed by this Order on the use of hay, straw, bran or dried brewers' grains for the feeding of any horse.

6. The person or persons in possession of any horse falling within the classes mentioned on the second and third Schedules shall keep records of the oats, maize, beans and peas used for feeding such horse and such records shall at all reasonable times be open to the inspection of an officer of police or any other person authorised by the Food Controller.

7. For the purpose of this Order—

"Horse" shall include mare, gelding, colt, filly, pony and mule.

"Thoroughbred horse" shall mean a horse whose sire and dam are entered in the General Stud Book.

"Cereal foodstuffs" shall include all grains and beans and products thereof.

The Order came into force on 21st May, 1917.

The Local Government Board, by arrangement with the Food Controller, have determined that the provisions of the Local Authorities (Food Control) Order (No. 1), 1917, shall apply to the above Order of the Food Controller as if that Order were mentioned in Column 1 and the whole of that Order were mentioned in Column 2 of the Schedule to the Local Authorities (Food Control) Order (No. 1), 1917.

SCHEDULE I.

(*Horses excluded from the operation of this Order.*)

1. Horses in the possession of the Army Council or the Admiralty, or exclusively used for the purposes of the Army Council or the Admiralty.
2. Horses maintained and used exclusively for agricultural purposes.
3. Stallions used exclusively for stud purposes.
4. Thoroughbred brood mares.
5. All other brood mares in foal or with foal at foot.

SCHEDULE II.

(*Horses other than thoroughbreds to receive rations.*)

Class of Horse.	Maximum Daily Ration in Oats.	
	When in hard and continual work.	When not in hard and continual work.
Horses solely or mainly used for trade or business purposes. (See Note 1 below)		
(*a*) Heavy dray or cart horses ..	16 lb.	12 lb.
(*b*) Trotting vanners	14 ,,	10 ,,
(*c*) Light horses and cobs ..	11 ,,	8 ,,
(*d*) Ponies 14 hands and under (See Note 2 below.)	7 ,,	5 ,,

NOTE.—(1) The hiring out of horses is not for the purpose of this Order a trade or business purpose.

,, (2) Pit ponies may be given 2 lb. extra per day.

SCHEDULE III.

(*Thoroughbred horses to receive partial ration*)

Class of Horse.	*Maximum Daily Ration in Oats.*
Thoroughbred horses :—	
(*a*) Weaned foals	6 lb.
(*b*) Yearlings—	
1st January to 31st May	6 ,,
1st June to 31st August	3 ,,
1st September to 31st December	6 ,,
(*c*) 2 and 3 year old fillies—	
1st January to 30th April	7 ,,
1st May to 31st October	3 ,,
1st November to 31st December	7 ,,
(*d*) Entire thoroughbreds, 2 years old and upwards not used for stud purposes	7 ,,

NOTE.—Age of a horse is to be reckoned as beginning on the 1st January of the year in which the horse was foaled.

SCHEDULE IV.

(*Horses not to receive any cereal foodstuffs.*)

(1) Racehorses and thoroughbreds, other than those specified in Schedules 1 and 3.

(2) Carriage horses, hacks, hunters, polo ponies, including all horses let out on hire for these purposes.

(3) Horses mainly used for other than business or trade purposes, including all horses let out on hire for other than these purposes.

(4) Horses not falling within any of the classes mentioned in the other Schedules to this Order.

Chopped Hay and Straw: Use of Straw.

The Army Council issued an Order, dated 9th May, 1917, to the effect that on and after 24th May, no chaffed or chopped hay shall be manufactured, purchased or delivered in Great Britain unless it contains not less than 20 per cent of chopped straw.

On and after the same date, no wheat straw shall be used for any purpose other than for feeding live stock and for thatching, and no oat straw for any purpose other than for feeding live stock, except in either case under license from the District Purchasing Officer of the district or county concerned.

Dealings in Oats (Restriction) Order, 1917.

AN Order, dated 14th May, 1917, was issued by the Food Controller to the effect that :—

1. Except under the authority of the Food Controller, no person shall either on his own behalf or on behalf of any other person

(*a*) buy, sell or deal in ; or

(*b*) offer, or invite an offer, or propose to buy, sell or deal in ; or

(*c*) enter into negotiations for the sale or purchase or other dealing in ;

any oats outside the United Kingdom, whether or not the sale, purchase or dealing is, or is to be, effected in the United Kingdom : Provided that until further notice all persons are authorised

(*a*) to ship, dispose of, and deal in oats already bought for future shipment ;

(*b*) to buy, sell or deal in oats on passage to, or arrived at, or already landed in the United Kingdom ;

(*c*) to fulfil any sales made prior to the date of this Order whether on a c.i.f. basis or on any other basis.

2. All persons concerned shall before 21st May, 1917, furnish to the Secretary of the Oats Control Committee, Grosvenor House, Upper Grosvenor Street, London, W. 1, a statement showing

(i.) stocks of their oats afloat,
(ii.) unshipped purchases of oats at the date of this Order,
(iii.) quantity sold or unsold in each case.

This Order came into force on the 15th May, 1917.

Oats Control Committee.

A COMMITTEE appointed by Lord Devonport to undertake the purchase and control of oats required from overseas for the United Kingdom and the Allies, and to take over the duties and responsibilities of the existing Allies Forage Committee, has been constituted as follows :—

Mr. S. F. Mendl (Chairman) ; The Right Hon. Thomas Wiles, M.P. ; Mr. R. H. Selbie ; Mr. E. J. Riley (War Office) ; Mr. H. Kent (Commission Internationale de Ravitaillement) ; M. Destombe (French Representative) ; Lieutenant Amadio (Italian Representative) ; M. van Rompa (Belgian Representative) ; and Mr. H. A. Francis (Secretary).

The present address of the Committee is Empire House, Kingsway, London, W.C. 2.

All persons dealing in imported oats are warned that the Oats Control Committee may call at any time for a return of all purchases and sales of such oats during a prescribed period, whether on a c.i.f. basis or on any other basis, and, that the Committee will report to the Food Controller, for such action as he may think necessary, any cases which they may find of attempts to withhold supplies from the market or to make undue profit.

AN Order, dated 9th May, 1917, was issued by the Food Controller, to the effect that:—

The Oat and Maize Products (Retail Prices) Order, 1917.

1. Except under the authority of the Food Controller no person shall on or after the 21st May, 1917, sell or buy or offer to sell or buy by retail,

(*a*) any maize flour, maize flakes, maize semolina, hominy, cerealine or maize meal at a price exceeding a price at the rate of 4*d.* per lb.

(*b*) any oatmeal, rolled oats or flaked oats or other like products of oats at a price exceeding a price at the rate of 5½*d.* per lb.

2. The maximum price shall include all charges for bags and other packages and no additional charge may be made therefor.

3. No person shall in connection with a sale or proposed sale of any article to which this Order applies enter or offer to enter into any fictitious or unreasonable transaction or make or propose to make any unreasonable charge.

4. Except in such cases as the Food Controller may otherwise determine, this Order shall apply to proprietary brands of the articles mentioned.

The Local Government Board, by arrangement with the Food Controller, have determined that the provisions of the Local Authorities (Food Control) Order (No. 1), 1917, shall apply to the above Order of the Food Controller as if that Order were mentioned in Column 1 and the whole of that Order were mentioned in Column 2 of the Schedule to the Local Authorities (Food Control) Order (No. 1), 1917.

THE Food Controller has issued an Order, dated 23rd May, 1917, to the effect that:—

Oat and Maize Products (Retail Prices) Order No. 2, 1917.

1. On and after 18th June, 1917, the maximum price mentioned in Clause 1 (*a*) of of the Oat and Maize Products (Retail Prices) Order, 1917 (hereinafter called the Principal Order), for maize flour, maize flakes, maize semolina, hominy, cerealine or maize meal shall be 3½*d.* per lb. in the United Kingdom, and the maximum price mentioned in Clause 1 (*b*) of the Principal Order for oatmeal, rolled oats, flaked oats or other like products of oats shall be 4½*d.* per lb. in Scotland and 5*d.* per lb. elsewhere in the United Kingdom, and the Principal Order shall take effect accordingly.

AN Order, dated 2nd May, 1917, was issued by the Food Controller to the effect that:—

The Maize, Barley and Oats (Restriction) Order, 1917.

1. (*a*) No person shall, after the 9th May, 1917, use or treat any maize, barley or oats or any product obtained from maize, barley or oats or any article containing maize, barley or oats or containing any such product except for the purposes permitted by this clause.

(*b*) The permitted purposes are seed, human and animal food and the manufacture of articles of food, but do not include the manufacture of glucose.

(*c*) This clause shall not apply to such products and articles as on the 9th May, 1917, are unfit to be used in human or animal food.

2. No person shall after the 9th May, 1917, use or treat any tapioca, sago, manioc or arrowroot for any purpose except for human food or in the manufacture of articles suitable for human food.

3. Any person authorised by the Food Controller may take samples of any cereal, or other article which he has reason to suspect is being used or treated or is intended to be used or treated in contravention of this Order.

Damaged Grain.

As there seems to be some misunderstanding in the trade with regard to dealings in damaged home-grown grain, it is pointed out that the charging of prices higher than those laid down in the Wheat, Barley and Oats (Prices) Order, 1917, or permitted under the general licence, coustitutes a contravention of the Order.

A dealer is entitled to charge a commission of 1*s*. per quarter over the price he is entitled to pay to the producer ; but no dealer is allowed to buy from another dealer and charge more than 1*s*. per quarter over the prices laid down in the Order. This does not apply to sales of quantities of not more than five sacks, in which case the total commission may amount to 3*s*. a quarter.

Preservation of Fruit and Vegetables Without Sugar.

A Circular, dated 21st May, 1917, has been issued by the Food Production Department of the Board stating that provision has been made for courses of training in the methods of preserving fruit and vegetables. Those who satisfy the Chief Instructor as to their efficiency will be appointed as Travelling Instructors for a period not exceeding three months, and will be required to carry out their duties in any part of the country to which they are assigned, giving practical demonstrations and instructions at various centres in which engagements are made for their services.

The classes given by the Travelling Instructors will be open, without fee, to persons invited by local Food Production Societies and similar organisations and it is hoped that those attending the demonstrations will undertake voluntarily to show villagers and others how to preserve surplus fruit and vegetables.

In order to assist the Department in arranging a programme of demonstrations, the person taking charge of the local organisation of instruction classes should communicate at once with the Department stating that the necessary local arrangements will be made. These arrangements include :—

1. The provision of suitable kitchens with range or gas-stove or boiler.
2. Utensils for fruit bottling (such as fish kettles) for boiling fruit.
3. Bottles or jam jars.

The importance of preserving surplus fruit and vegetables cannot be emphasised too strongly, and bottling on a large scale will be one of the chief means of preventing the waste of perishable fruit.

THE following Notice has been issued by the Food Production Department of the Board :—

Glass Jars for Preserving Fruit and Vegetables.

The Food Production Department has arranged with the Ministry of Munitions of War to supply glass jars for preserving fruit and vegetables. The price of the bottles is 52*s*. per gross, delivered to the nearest railway station. Orders must be for not less than 100 dozen, and preferably for 400 dozen (1 truck load). The requirements of every district must be ascertained by a responsible authority and submitted collectively. Only one order can be accepted from a locality; the orders of private individuals cannot be accepted. The Department will shortly be in a position to meet demands to the extent of 2,000 gross jars per week. For further particulars apply to The Director-General, Food Production Department, 72, Victoria Street, London, S W. 1.

Marketing and Distribution of Grain and Potato Crops of 1917.

THE Food Controller has appointed a Committee to advise the Ministry of Food on any questions which may arise in regard to the marketing and distribution of the 1917 crops of grain and potatoes. The Committee is constituted as follows :—

Mr. Anker Simmons (Chairman); Mr. J. H. Campbell, Mr. Thos. Darling, Mr. John W. Dennis, Mr. Samuel Farmer, Mr. Charles B. Fisher, Capt. R. B. Greig, Mr. Harry Hope, M.P., Mr. S. F. Mendl, Mr. Hugh Rathbone, Mr. George Walter Roffey, Mr. Wm. Soundy, Mr. Arthur C. Sadd, Mr. W. A. Smith, The Hon. E. G. Strutt, Mr. A. E. K. Wherry, and Professor T. B. Wood.

THE following Notice has been issued by the Food Production Department of the Board :—

The Spraying of Potatoes Grown by Small Cultivators in England and Wales—Arrangements for 1917.

In order to prevent the loss of potatoes from disease the Director of Horticulture (Food Production Department) has made arrangements in order to enable all allotment holders, gardeners and small cultivators generally to spray their crops. Individuals can greatly assist by joining or forming small local societies with a view to having their orders submitted in bulk by the secretary.

Knapsack Spraying Machines.—A committee of experts appointed by the Department after testing the chief types of knapsack sprayers has recommended the "Four Oaks," "Stonehouse" and "Mysto" patterns. Orders have been placed with the manufacturers for a supply of these machines. The two first types have external pumps and air chambers, and the latter an internal pump and air chamber similar to the French Vermorel type of machine. They are all made of copper, weigh when empty about 14 lb., and hold 3 to 3¼ gal. of liquid. They are suitable not only for spraying potatoes but also for keeping fruit trees clean. They may be used for practically all washes except those containing sulphur.

Knapsack spraying machines ordered from the Food Production Department may be obtained for £3, *inclusive of packing and delivery* to the nearest railway station. Instructions as to use will be sent with each machine.

To secure early delivery machines should be ordered without delay. Orders should be accompanied by cheque drawn in favour of the "Food Production Department" or "Bearer" and crossed "Bank of England." When a cheque requires to be altered from "Order" to "Bearer" the alteration should be initialled by the drawer of the cheque. In order to save labour and paper it is not proposed to acknowledge the receipt of remittances unless in any instance this is specially requested.

Materials for Spraying.—Arrangements are being made for the supply at cost price of spraying materials ready for use. Details of these arrangements will be published shortly. Copper sulphate and soda, put up in small bags and packed in wooden cases holding sufficient to spray one and one-third acres twice will cost 24*s.* a case.

Where individuals require only small bags of chemicals they should arrange with neighbours to send a combined order for not less than one case. By so doing they will save the railway companies unnecessary handling of goods.

Organisation.—For the purpose of organisation the country is being divided as far as possible into county areas for each of which an honorary organiser or supervisor will be appointed. The supervisors will assist local societies in preparing for the work of spraying. Societies are asked to help by sending in orders at once.

Instruction.—Experts will be available for the purpose of giving demonstrations in spraying. Applications for their services should be made to the Food Production Department.

Leaflet.—An illustrated leaflet on the spraying of potatoes and the organisation for 1917 has been published, and will be sent free on application to all Food Production Societies and similar organisations.

Applications should be addressed to the Food Production Department, 72, Victoria Street, London, S.W. 1, and need not be stamped.

THE following Circular, dated 17th May, 1917, has been addressed by the Director-General of the Food Production Department of the Board to Agricultural Executive Committees in England and Wales :—

Rabbits.

SIR,—1. In a Circular Letter, issued by this Department on 7th April, 1917,[*] Agricultural Executive Committees were invited to take all possible steps to induce landlords and shooting tenants to reduce the numbers of rabbits in order to minimise the danger of injury to crops and pasturage. It was pointed out that powers had been conferred on the Board of Agriculture by Regulation 2R of the Defence of the Realm Regulations to take compulsory measures for this purpose, and the Agricultural Executive Committees were asked to report to this Department if they should feel that a sufficient reduction of rabbits could not be obtained by the voluntary co-operation of owners and shooting tenants.

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[*] See *Journal*, May, 1917, p. 250.

2. While in most instances such co-operation has been freely given, Agricultural Executive Committees have been obliged in a substantial number of cases to report that no sufficient reduction can be secured without compulsory powers. It has therefore been decided by the Rabbits Order, 1917,* of which copies are sent herewith, to delegate to the Committees power to take the necessary action where they consider it desirable in order to prevent injury to crops or trees or wastage of pasturage; and to authorise farmers and other persons to enter upon land for the purpose of killing and taking rabbits.

3. In every case in which the Committee consider that action should be taken, it will be necessary for the Committee (as provided in Article 2 of the Order) to give authority in writing to a person named to enter upon the land described in the authority and to kill and take the rabbits, and to give instructions as to the disposal of the rabbits.

4. The person named may be the occupier of the land affected by the excessive number of rabbits, or any other person whom the Committee think fit to employ for the purpose. In addition to the authority above referred to, the Committee should give that occupier or other person instructions, directing him to take the action indicated in the authority.

I am, etc.,
ARTHUR LEE,
Director-General.

THE following Order, dated 12th May, 1917, has been issued by the Board of Agriculture and Fisheries:—

The Rabbits Order, 1917.

(1) The War Agricultural Executive Committee constituted under any Order made by the Board under the said Regulations † for any county are hereby authorised within the county to exercise on behalf of the Board the powers conferred by Regulation 2R so far as is necessary for the purposes of this Order.

(2) Where the Committee are satisfied that injury to crops or trees or wastage of pasturage is being caused or is likely to be caused by rabbits, and that the exercise of the powers hereby conferred is desirable, the Committee may take such action as in their opinion is necessary or expedient with a view to preventing or reducing such injury or wastage, and for such purposes may by writing authorise any person named in such authority on their behalf to enter upon any land described in any such authority for the purpose of killing and taking the rabbits upon such land, and to kill and take the rabbits, subject to such limitations as may be contained in the authority, and any rabbits killed under this provision shall be disposed of in such manner as the Committee shall authorise and direct.

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* Printed below. † 2 R.

(3) Nothing herein contained shall be deemed to authorise the use of firearms for the purpose of killing rabbits between the expiration of the first hour after sunset and the commencement of the last hour before sunrise, or the use of spring traps except in rabbit holes, or the use of any poison or poisonous ingredient, or be deemed to exempt any person from the provisions of the Gun Licence Act, 1870.

(4) The powers herein before authorised to be executed by a War Agricultural Executive Committee constituted for a county may be exercised in the city and county borough of Birmingham by the War Agricultural Executive Committee constituted under the Cultivation of Lands (Birmingham) Order, 1917 (No. 2), and in any other county borough by the Council of the Borough.

(5) This Order applies to England and Wales.

THE following Notice has been issued by the Food Production Department of the Board :—

The Destruction of Wasps.

In view of the large amount of damage done to fruit by wasps, and the annoyance they cause to horses and cattle, it is necessary that steps should be taken to keep down their numbers. The capture of queen wasps in the spring is very desirable, and is encouraged in many districts by the offer of a small reward. It has also been found that traps (such as jars or bottles containing beer or sugar) which are often used later in the season against worker wasps, when used in spring, account for a large number of queens.

Nests should be marked down as soon as possible, and dealt with before they have become too strong. Various means are employed for taking nests on the ground, such as burning or smoking them with tar, paraffin or sulphur. In many districts, potassium or sodium cyanide is used most effectively. However, the supply of cyanide this year is very uncertain, whilst the price is sure to be high. Where cyanide can be obtained, its use is the best and simplest method for destroying wasps. A little cyanide is placed inside the entrance to the nest after the wasps have returned in the evening. The hole is then blocked up and further trouble is seldom experienced, although to make sure, the nest is sometimes dug out after the adult wasps have been killed. It must not be forgotten that cyanide is a deadly poison, and great care must be exercised when handling it.

THE following Circular, dated 1st June, has been addressed by the Director-General of the Food Production Department of the Board to Agricultural Executive Committees in England and Wales :—

Destruction of Pheasants.

SIR,—1. I enclose herewith copies of the Destruction of Pheasants Order, 1917 (No. 2)*, and the Pheasants (Rearing) Order, 1917,* which have been made by the Board of Agriculture and Fisheries under the powers conferred upon them by Regulation 2R of the Defence of the Realm Regulations.

2. By the Destruction of Pheasants Order, 1917, Agricultural Executive Committees were enabled, where they were satisfied that

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* Not here printed.

the stock of pheasants on any land was not being so reduced as to prevent substantial injury to the crops, to authorise and direct the occupier to kill the pheasants on the land in his occupation. This power expired on 31st March, 1917. Reports have now been received from various parts of the country that pheasants are still numerous in many places and are doing damage to growing crops, and accordingly the power delegated to Agricultural Executive Committees by the earlier Order has been extended without limit of time by the Destruction of Pheasants Order, 1917, No. 2. It may be exercised in the manner indicated in the Circular A.300/C, dated the 2nd March, 1917, to which Agricultural Executive Committees are referred.

3. The limitations contained in the earlier Order as to the putting of poison on the ground and other matters are continued in the present Order.

4. Article 2 of the present Order enables persons who are entitled ordinarily to kill pheasants in the shooting season to do so at any time while the Order is in operation; and legalises the sale, purchase and possession of pheasants during the continuance of the Order.

5. By the Pheasants (Rearing) Order, 1917, the hatching and rearing of pheasants by any artificial means is prohibited except under licence issued by the Board. This prohibition applies (among other matters) to the common method of hatching pheasants by putting the eggs under a hen, to feeding the birds by hand, and so on. The power to issue licences is reserved by the Board and is not delegated to Agricultural Executive Committees.

6. The Committees may, however, where they have reason to think that the prohibition contained in the Order is not being complied with, authorise any person to enter on any land for the purpose of ascertaining whether this is being done. Any such authority should be given in writing, as it must be produced if required. If the result of an inquiry by any person so authorised is to establish that the requirements of the Order are not being complied with, the facts should be reported to this Department.

I am, etc.,
A. LEE,
Director-General.

Reduction in Acreage under Hops in England and Wales.

THE following Order in Council, dated 19th May, has been issued:—Subject to the provisions of this Regulation, the acreage cultivated with hops on any holding in England or Wales shall, before 30th June, 1917, be reduced to one-half of the acreage on the holding which was so cultivated in June, 1914, and thereafter, so long as this Regulation remains in force, the acreage on the holding so cultivated shall never exceed that proportion.

Any occupier of two or more holdings may arrange the reduction on his various holdings as he wishes, provided he effects a reduction of one-half on the whole. He must send particulars of his acreage on each of the holdings in his occupation in 1917 and 1914 to his County War Agricultural Committee.

THE following Notice, dated June, 1917, has been issued by the Food Production Department of the Board :—

Prices of Sulphate of Ammonia.

The attention of manure mixers, agricultural merchants, co-operative societies and farmers is drawn to the advantages to be obtained from ordering sulphate of ammonia at once.

Prices have been arranged with the manufacturers for the season ending 31st May, 1918, in such a way as to give an advantage of £1 per ton to those who purchase before the end of September.

Dealers and others having good dry storage accommodation should take advantage of this offer.

1. The terms and conditions which will be applicable to the sale of sulphate of ammonia 24½ per cent. basis, in makers' single bags, net cash delivered to consumer's station in any part of the United Kingdom, in quantities of not less than two tons, are—

For orders placed with makers for delivery during the following periods :—

(*a*) *1st June*, 1917—*30th September*, 1917, £15 7*s* 6*d. per ton.*

For this period orders for 60 tons and upwards are to be placed *by the 20th June* for delivery in Great Britain, and by the 10th July for delivery in Ireland. Delivery in Great Britain must be in four equal monthly quantities, and in Ireland in three equal monthly quantities. Smaller quantities must be ordered before the 15th September.

(*b*) *1st October*, 1917—*31st December*, 1917, £15 15*s. per ton.*

For this second period orders for 60 tons and upwards must be placed by the 10th September for delivery in three equal monthly quantities either for Great Britain or Ireland. Smaller quantities must be ordered by the 10th of each month for delivery during that month.

(*c*) *1st January*, 1918—*31st May*, 1918, £16 7*s*. 6*d. per ton.*

For this third period all orders, large and small, must be given by the 10th of each month for delivery during that month.

The foregoing prices are subject to a discount for cash of 10*s*. per ton to manure mixers, agricultural merchants and dealers, and co-operative societies.

2. Quantities of less than 2 tons will be supplied at the above rates, provided they form part of a bulked order of not less than 2 tons, so as to facilitate railway transport and avoid the wasteful use of trucks.

3. Where the purchaser takes delivery at the maker's works for conveyance otherwise than by rail the price will be 10*s*. per ton less. For sulphate of ammonia of a higher or lower quality a difference of 3*s*. 3*d*. per ton is to be allowed in respect of each quarter per cent.

above or below 24½ per cent. Fractional differences of less than a quarter per cent. will not be taken into account. Where makers require purchasers to provide their own bags the actual cost of bags at the time of delivery shall be allowed.

4. The net cash retail prices of sulphate of ammonia to consumers, in quantities under 2 tons, for delivery *in Great Britain* by dealers *ex* store or by makers *ex* works, shall not exceed the following:—

	Quantities of 28 lb. and less than 1 cwt.	*1 cwt. and less than 2 cwt.*	*2 cwt. and less than 1 ton.*	*1 ton and less than 2 tons.*
	Per cwt.	*Per cwt.*	*Per cwt.*	*Per ton.*
1st June, 1917, to 31st December, 1917 ..	20*s.*	18*s.*	17*s.*	£16 10*s.*
1st January, 1918, to 31st May, 1918 ..	21*s.*	19*s.*	18*s.*	£17 5*s.*

No additional charge to be made for excess over 24½ per cent. basis in respect of these small quantities.

Dealers and farmers, if unable to obtain supplies from local works, should apply to the Sulphate of Ammonia Distribution Committee, Food Production Department, 72, Victoria Street, London, S.W. 1.

Harvest Weather Forecasts.

THE Meteorological Office will, as in past years, but subject to certain restrictions, supply forecasts of weather by telegraph to persons desirous of receiving them, upon payment of a registration fee of 1*s.* and the cost of the telegrams, computed at 9*d.* per day. The supply of forecasts will continue until 30th September. The forecasts are drawn up each week-day at 3.30 p.m., and refer to the probable weather during the 15 hours from 6.0 a.m. to 9.0 p.m. on the next day. The addition of a "further outlook" and the issue of notifications in connection with spells of settled weather are suspended during the War.

Applications for the forecasts should be sent to the Director, Meteorological Office, South Kensington, London, S.W., with a cheque or postal order payable to the Meteorological Committee, to cover the cost of the telegrams for the period, which should not be less than 6 consecutive days, during which the forecasts are to be sent.

Report for 1916 of the Animals Division of the Board.

THE Annual Report for 1916, of the proceedings of the Board, under the Diseases of Animals Acts and Fairs (Weighing of Cattle) Acts, etc., has been issued in the abbreviated form adopted last year. The two chief matters dealt with are the new procedure with regard to swine fever and the reappearance of foot-and-mouth disease in 1916. Price 3*d.*, from H.M. Stationery Office, Imperial House, Kingsway, London, W.C.; or through any bookseller.

Produce of Crops in England and Wales in 1916.

PART II. of the Agricultural Statistics for 1916, containing returns of produce of crops in England and Wales in 1916, with summaries for the United Kingdom, has been published [Cd. 8559, price 2*d*.]. From H.M. Stationery Office, Imperial House, Kingsway, London, W.C.; or through any bookseller.

THE following Memorandum, dated 14th May, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees:—

Payment of Tithe.

Where an Executive Committee have taken possession of land under the powers of Regulation 2M, they are authorised to pay the tithe rent-charge accruing due after the date of taking possession, as well as arrears for two years previous to that date, provided that proceedings for the recovery of the rent-charge are taken within two years of the due date of payment.

If the Committee make such payment of tithe, any claim made by the landlord for compensation, on account of his having been dispossessed under Regulation 2M, will be subject to reduction on account of the Committee discharging the landlord's obligations as to tithe rent-charge in the manner above indicated. It is possible that the landlord might prefer to pay the tithe rent-charge himself, even after possession has been taken by the Committee, and so be able to claim compensation without any reduction of this kind. Before the Committee pay the tithe rent-charge, current or in arrear, the landlord should be communicated with and asked to exercise his option; if he desires that the tithe rent-charge should be paid by the Committee, the Committee may make the payment to the extent above indicated.

Tithe, Copyhold, Inclosure, Commons, and other Acts Administered by the Board of Agriculture and Fisheries.

ATTENTION is drawn to a Table of Revised Fees payable by the public, which have been prepared by the Board and approved by the Treasury, in respect of transactions under the Tithe, Copyhold, Inclosure, Commons and other Acts administered by the Board. The Final Report of the Retrenchment Committee [Cd. 8200], dated 21st February, 1916, contained a recommendation for increasing the fees taken by Public Departments and the detailed fees which were prepared in view of that recommendation, and which are now in operation, are set forth in No. 932 of the Statutory Rules and Orders, 1916, copies of which may be obtained from H.M. Stationery Office, Imperial House, Kingsway, W.C., price 1½*d*., post free.

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

ACCORDING to the *International Crop Report and Agricultural Statistics* for May, 1917, issued by the International Institute of Agriculture, the production of wheat in Argentina, Uruguay, Australia, and New Zealand is placed at 29,080,000 qr. in 1916–17, against 46,144,000 qr. in 1915–16, or a decrease of 37·0 per cent., and of oats at 6,521,000 qr. in 1916–17, against 10,984,000 qr. in 1915–16, or a decrease of 40·6 per cent.

Sowing of Winter Cereals in the Northern Hemisphere.—The area estimated to have been sown with winter *wheat* in 1916–17, compared with the areas sown during the corresponding period of 1915–16, expressed as percentages, are as follows: Denmark 93, Spain 105, France 85, Great Britain 92, Switzerland 104, Canada 67, United States 79, India 109, Japan 100, Algeria 96; with *rye*—Denmark 95, Spain 100, France 90, Switzerland 105, United States 121; with *barley*—Spain 93, France 110, Switzerland 99, Japan 88, Algeria 95; with *oats*—Spain 119, France 95, Great Britain 92, Switzerland 108, United States 79, Algeria 98; with *maize*—Switzerland 120.

Live Stock in France.—The numbers of farm stock on the 31st December, 1916, were as follows (the corresponding numbers on the 1st July, 1916, being shown in brackets): horses 2,245,630 (2,281,415); mules 147,630 (150,069); asses 326,570 (329,459); cattle 12,341,950 (12,723,946); sheep 10,845,280 (12,079,211); pigs 4,361,900 (4,448,366). (*International Crop Report and Agricultural Statistics*, May, 1917.)

Live Stock in New Zealand.—The numbers of live stock on the 1st January, 1916 were as follows (the numbers on the 1st April, 1911, being shown in brackets):—Horses 347,345 (404,284); cattle, including dairy cows, 2,387,036 (2,020,171); pigs 292,115 (348,754). The number of sheep on the 30th April, 1916, was 24,788,150 against 23,996,126 on the corresponding date in 1911. (*International Crop Report and Agricultural Statistics*, May, 1917.)

United States.—According to a report issued by the Statistical Bureau of the Department of Agriculture, the yield of winter wheat is estimated at 373,000,000 bush. as compared with 482,000,000 bush last year; spring wheat, 283,000,000 bush. against 158,000,000 bush.; oats, 1,381,000,000 bush. against 1,251,000,000 bush.; barley, 214,000,000 bush. against 180,000,000 bush.; and rye, 58,000,000 bush.; against 47,000,000 bush. in 1916. The area under spring wheat this year is 19,039,000 acres, as compared with 17,956,000 acres harvested last year, and oats 43,161,000 acres against 41,539,000 acres in 1916. (*Broomhall's Corn Trade News*, 9th June.)

Holland.—His Majesty's Consul-General at Rotterdam reports that, in consequence of the severe winter and unfavourable spring, garden produce under glass is on the whole about a month late, and many young plants suffered from the frost. Improvement with warmer weather, however, is anticipated. The condition of strawberries is moderate on the whole, with a few exceptions where they are good. Prospects for tomatoes are not bad, but cucumbers are disappointing. Roots, cauliflowers and lettuce are generally moderate, though good in a few districts.

France.—The area under winter wheat is officially estimated at 9,432,000 acres, and spring wheat at 958,000 acres, making a total of 10,390,000 acres as compared with 12,800,000 acres last year. The condition of winter wheat on 1st May was estimated at 52, against 8 last year, and of spring wheat 57 against 72 on 1st May, 1916. (50 = passable; 60 = fairly good; 80 = good). (*Broomhall's Corn Trade News*, 6th June).

Russia.—His Majesty's Commercial Attaché at Petrograd states that, according to an official report published in the Trade Gazette of 9th May, winter grain is generally satisfactory, but the area has substantially decreased. The sowing of spring grain is not yet finished, and in some districts had only just commenced by the middle of April, also on a reduced area.

Canada.—According to a report, dated 25th May, received from the High Commissioner for Canada, the acreage under wheat in Manitoba will compare favourably with that of last year, and in Saskatchewan the acreage is the same as last year. Conditions were excellent for germination.

In a later report, dated 1st June, it is stated that wheat in Manitoba is making strong and vigorous growth, and in Saskatchewan this crop is making rapid progress. In Alberta wheat is well rooted, of sturdy appearance, and making good progress.

According to a report, dated 8th June, spring sowing is practically completed in Ontario, and the young crops promise well. Autumn wheat is improving. The fruit and general agricultural production is expected to be heavy in British Columbia. The stocks of grain in farmer's hands on 31st March are estimated by the Census and Statistics Office at Ottawa as follows: wheat, 45,638,000 bush. or 21 per cent. of the total production for 1916; oats, 136,179,000 bush. (39 per cent.); barley, 10,559,000 bush. (26 per cent.); rye, 813,500 bush. (28 per cent.); flax, 1,413,000 bush. (20 per cent.); potatoes, 15,969,000 bush. (26 per cent.); and hay and clover, 4,802,000 tons (32 per cent.). The stocks of corn are smaller and of hay larger than in any year on record.

India.—According to the final official forecast, the area under wheat in 1916–17 is estimated at 33,040,000 acres, as compared with 30,255,000 acres last season, and the production at 47,413,000 qr. against 47,922,000 qr. in 1915–16. The acreage of linseed this season is estimated at 3,533,000 acres, against 3,317,000 acres, and the production at 520,000 tons, against 474,000 tons last season. (*London Grain, Seed and Oil Reporter*, 31st May.)

Agricultural Conditions in England and Wales on 1st June.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st June, state that the increased warmth and rains of the latter part of May greatly improved the prospects of all crops. Wheat has improved, but there are in nearly all parts a certain proportion of patchy fields, and, on the whole the crop can hardly be described as more than moderate. Barley and oats are germinating very satisfactorily and everywhere present a promising appearance, except winter oats, which suffered much from the great cold, and in some districts wireworms have been troublesome. The area under barley will probably prove to be about the same as last year; while that of oats is from 8 to 9 per cent. greater, the increase being most pronounced in the west. Beans are, generally speaking—although there are exceptions—a poor crop, especially the winter sown. Peas are better, though very variable in different districts, and are probably hardly up to average on the whole.

Potato planting was late, but is now generally finished; the young crops, where through the ground, are a good, even plant, and look very promising. In the case of this crop, an increase in the total area of 10 per cent. is looked for, the increase being here also chiefly in the west.

Mangold sowing is not yet everywhere completed, but the work has been done under favourable conditions, and a good seed bed was obtained. Where up, the young plants appear to have germinated evenly, and prospects are quite satisfactory. Turnip sowing is very backward, and comparatively little has been done, but the land has been got into good order for the reception of the seed.

Hops are naturally very backward, but the bine made vigorous growth, both in the eastern and western districts, during the second half of May, and the plant is strong and healthy, so that prospects are satisfactory. The area from which a crop will be taken will be about three-fifths of last year's acreage, or half the 1914 area.

The rain and warm weather of May has made a great difference to the grass, and present appearances indicate an average yield of hay, both in the case of clovers and of permanent grass. Seeds' hay is, however, less promising in the south-west, while meadow hay is not up to the average in the eastern counties. The area of seeds which it is intended to mow is about 3 per cent. less than last year, but the area of meadow hay will probably be about the same as in 1916.

There has been abundance of blossom on all fruit trees, which has generally set well, so that prospects in the case of both orchard and small fruit are for heavy crops. The poorest prospects relate to plums, and even in their case there are more than three reports of over-average promise to every one mentioning poor prospects.

Pastures have now, except in a very few districts, plenty of grass, and the condition of all live stock shows much improvement in consequence.

The great deficiency in labour has been mitigated by the employment of soldiers, but their withdrawal from many districts is now being rather seriously felt. The shortage is now most acute for hoeing crops, and in many parts fields are becoming rather foul. At the May hirings wages showed a further rise.

The following local summaries give further details regarding agricultural conditions in the different districts of England and Wales :—

Agricultural Labour in England and Wales during May.

Northumberland, Durham, Cumberland, and Westmorland.—The supply of skilled labour is very deficient, and the shortage is being more felt since some of the soldiers have been recalled. At the Whitsuntide hirings youths and men over military age were engaged at increased wages.

Lancashire and Cheshire.—The supply of labour is deficient, but the fine weather has helped matters very considerably.

Yorkshire.—The supply of labour is still deficient, as many soldiers have been recalled from the farms.

Shropshire and Stafford.—Labour is scarce, but great assistance has been rendered by soldiers.

Derby, Nottingham, Leicester, and Rutland.—Labour is very scarce, and the scarcity is likely to become serious, with the withdrawal of part of the soldier labour.

Lincoln and Norfolk.—The supply of labour is deficient, especially in Lincolnshire, where the land is foul in consequence. Wages showed a considerable increase at the May hirings.

Suffolk, Cambridge, and Huntingdon.—The supply of labour is very short, but the weather has been favourable for field work. Probably much less corn will be hoed than usual for lack of labour.

Bedford, Northampton, and Warwick.—The deficiency in the supply of labour is still felt very keenly, although to some extent this is made up for by the willing assistance given by soldiers and women. Wages, especially of skilled labour, have been increased in most districts.

Buckingham, Oxford, and Berkshire.—With the assistance of soldiers and women, the essential work has been done, but the supply of labour is very deficient.

Worcester, Hereford, and Gloucester.—The supply of labour continues to be very short.

Cornwall, Devon, and Somerset.—Labour is for the most part scarce, but great assistance has been given by the release of soldiers, and the favourable weather of the past month has enabled arrears of work to be cleared up. Wages show an upward tendency.

Dorset, Wiltshire, and Hampshire.—The supply of labour is short, but considerable assistance has been rendered by soldiers and women. A shortage for hoeing is feared.

Surrey, Kent, and Sussex.—The supply of labour is still deficient in most districts.

Essex, Hertford, and Middlesex.—Labour is very scarce. Women are largely employed in some districts, and assistance from soldiers in others, during the early part of the month, was very helpful.

North Wales.—Experienced men are scarce, and generally the supply of labour is deficient.

Mid-Wales.—The supply of labour is short, but soldiers have been of great service.

South Wales.—Labour is still deficient in most districts, but there are signs of improvement in a few localities.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st June, 1917, certain diseases of animals existed in the countries specified :—

Denmark (month of March).—Anthrax, Foot-and-Mouth Disease, Swine Erysipelas, Swine Fever.

France (for the period 22nd April—5th May).—Anthrax, Blackleg, Foot-and-Mouth Disease, Glanders and Farcy, Rabies, Sheep-scab, Swine Erysipelas, Swine Fever.

Holland (month of April).—Anthrax, Foot-and-Mouth Disease, Foot-rot, Swine Erysipelas.

Italy (for the period 16th—22nd April).—Anthrax, Black-leg, Foot-and-Mouth Disease (563 outbreaks), Glanders and Farcy, Rabies, Sheep-scab, Swine Fever.

Norway (month of April).—Swine Fever.

Russia (month of October).—Anthrax, Cattle-plague, Foot-and-Mouth Disease (50,680 animals), Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Erysipelas, Swine Fever.

Sweden (month of April).—Anthrax, Swine Fever.

Switzerland (for the period 7th—13th May).—Anthrax, Blackleg, Foot-and-Mouth Disease (6 " etables " entailing 85 animals, of which 6 " etables " were declared infected during the period), Swine Fever.

No further returns have been received in respect of the following countries : Austria, Belgium, Bulgaria, Germany, Hungary, Montenegro, Rumania, Serbia, Spain.

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(*From the Returns of the Board of Agriculture and Fisheries.*)

DISEASE.	MAY.		FIVE MONTHS ENDED MAY.	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	38	54	268	275
Animals attacked	40	60	305	320
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	24
Glanders (including Farcy):—				
Outbreaks...	2	—	11	21
Animals attacked	2	—	21	62
Parasitic Mange:—				
Outbreaks	173	170	1,374	1,332
Animals attacked	281	279	2,824	3,103
Sheep-Scab:—				
Outbreaks	20	7	368	172
Swine Fever:—				
Outbreaks	288	524	1,128	2,047
Swine slaughtered as diseased or exposed to infection	127	1,735	471	6,426

IRELAND.

(*From the Returns of the Department of Agriculture and Technical Instruction for Ireland.*)

DISEASE.	MAY.		FIVE MONTHS ENDED MAY.	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	—	1	2	2
Animals attacked	—	1	2	6
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	—
Parasitic Mange:—				
Outbreaks	7	1	23	29
Sheep-Scab:—				
Outbreaks	17	12	210	212
Swine Fever:—				
Outbreaks	16	23	124	123
Swine slaughtered as diseased or exposed to infection	113	126	854	656

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in May and April, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	MAY. First Quality.	MAY. Second Quality.	APRIL. First Quality.	APRIL. Second Quality.
FAT STOCK :—	per stone.*	per stone.*	per stone.*	per stone.*
Cattle :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Polled Scots	17 11	16 11	17 0	16 3
Herefords	17 2	15 11	16 9	15 5
Shorthorns	17 5	16 2	16 11	15 8
Devons	17 3	15 6	17 1	15 6
Welsh Runts	—	16 4	16 11	15 0
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	16¼	14	15¼	13¼
Sheep :—				
Downs	17¾	16½	15½	14½
Longwools	16½	15¼	14¼	13¼
Cheviots	19	17½	16¾	15½
Blackfaced	18¾	17½	16¾	15¼
Welsh	17	15¾	16	14½
Cross-breds	18	16½	15¼	14¼
	per stone.*	per stone.*	per stone.*	per stone.*
Pigs :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Bacon Pigs	16 0	15 0	16 1	15 2
Porkers	16 5	15 6	16 8	15 10
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ *s.*	£ *s.*	£ *s.*	£ *s.*
Shorthorns—In Milk ...	42 16	34 7	41 18	33 5
„ —Calvers ...	40 16	32 16	40 1	31 15
Other Breeds—In Milk ...	39 9	31 13	43 1	31 17
„ —Calvers ...	28 0	25 10	27 10	26 0
Calves for Rearing	3 16	2 18	3 12	2 16
Store Cattle :—				
Shorthorns—Yearlings ...	16 16	15 0	16 18	14 18
„ —Two-year-olds...	27 0	22 18	26 14	22 16
„ —Three-year-olds	35 8	29 19	35 12	29 11
Herefords —Two-year-olds...	28 8	22 12	30 5	24 5
Devons— „	29 1	24 9	28 9	23 12
Welsh Runts— „	26 9	21 15	25 18	23 1
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Downs or Longwools ...	80 11	68 8	70 7	61 11
Store Pigs :—				
8 to 12 weeks old	35 1	26 8	36 3	28 3
12 to 16 „ „	57 5	45 2	59 7	46 8

* Estimated carcass weight.

AVERAGE PRICES OF DEAD MEAT at certain MARKETS in ENGLAND in May, 1917.

(*Compiled from Reports received from the Board's Market Reporters*).

Description.	Quality.	Birmingham.		Leeds.		Liverpool.		London.		Manchester.	
		per cwt.		per cwt.		per cwt.		per cwt		per cwt.	
		s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
BEEF :—											
English	1st	122	0	122	0	—		124	6	124	0
	2nd	117	6	116	6	—		120	0	117	6
Cow and Bull	1st	113	0	112	6	108	6	108	0	110	0
	2nd	104	0	105	0	94	6	101	6	100	0
Irish : Port Killed	1st	121	6	—		118	0	122	6	119	6
	2nd	112	0	—		109	0	117	6	115	0
Argentine Frozen—											
Hind Quarters	1st	107	6	—		—		—		—	
Fore ,, ...	1st	95	6	—		—		—		—	
Argentine Chilled—											
Hind Quarters	1st	115	0	113	6	116	0	113	6	116	0
Fore ,, ...	1st	99	6	102	0	98	6	99	0	98	6
American Chilled—											
Hind Quarters	1st	—		—		—		118	6	—	
Fore ,, ...	1st	—		—		—		102	6	—	
VEAL :—											
British	1st	127	0	—		137	6	129	6	137	0
	2nd	117	6	112	0	108	6	111	0	102	6
Foreign...	1st	—		—		—		—		—	
MUTTON :—											
Scotch	1st	—		162	6	167	0	171	6	160	6
	2nd	—		147	0	154	0	162	6	148	6
English...	1st	156	0	162	6	149	6	162	6	151	0
	2nd	145	6	147	0	126	0	153	0	138	0
Irish : Port Killed	1st	158	6	—		157	0	—		149	6
	2nd	149	6	—		143	0	—		135	6
Argentine Frozen	1st	96	6	95	6	95	0	93	6	95	0
New Zealand ,, ...	1st	86	6	—		87	0	87	6	87	0
Australian ,, ...	1st	—		—		—		87	6	—	
LAMB :—											
British	1st	172	6	173	6	171	0	178	6	172	6
	2nd	162	6	160	6	155	0	168	0	162	6
New Zealand	1st	100	6	—		98	0	98	0	98	0
Australian	1st	100	6	—		—		98	0	—	
Argentine	1st	106	0	105	0	104	6	102	6	104	6
PORK :—											
British	1st	135	6	130	6	115	0	128	0	114	0
	2nd	129	0	121	6	104	6	117	6	106	6
Frozen	1st	103	6	102	6	96	0	104	0	99	6

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in May, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	BRISTOL. First Quality.	BRISTOL. Second Quality.	LIVERPOOL. First Quality.	LIVERPOOL. Second Quality.	LONDON. First Quality.	LONDON. Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	22 9	21 9
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	202 0	198 0	198 0	195 0	201 0	197 0
,, Factory	188 0	184 0	183 0	178 0	189 0	182 6
Danish	—	—	209 0	206 0	207 0	203 6
French	—	—	—	—	212 6	207 0
Dutch	—	—	—	—	199 6	193 0
American	—	—	—	—	—	—
Australian	197 0	193 6	198 0	192 0	195 0	191 0
New Zealand	207 6	205 6	206 0	204 0	205 6	201 6
Argentine	—	—	198 0	194 0	192 0	188 0
CHEESE :—						
British—						
Cheddar	166 0	163 0	—	—	165 0	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	162 6	157 6	176 6	—
			per cwt.	per cwt.	per cwt.	per cwt.
Canadian	162 0	160 0	163 0	—	162 0	—
BACON :—						
Irish (Green)	147 0	145 0	149 6	147 0	146 0	142 0
Canadian (Green sides)	139 6	137 6	139 6	137 6	137 0	135 0
HAMS :—						
York (Dried or Smoked)	—	—	—	—	190 0	180 0
Irish (Dried or Smoked)	—	—	—	—	158 6	154 0
American (Green) (long cut)	131 0	127 6	136 0	134 0	133 6	129 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	21 10	20 2
Irish	21 4	—	21 1	20 0	21 8	20 8
Egyptian	12 10	—	13 0	12 0	15 1	14 1
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	—	—	—	—	245 0	—
Edward VII.	—	—	—	—	245 0	—
Evergood	—	—	—	—	245 0	—
HAY :—						
Clover	—	—	—	—	140 0	130 6
Meadow	—	—	—	—	140 0	130 6

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1915, 1916 and 1917.

Weeks ended (*in* 1917).	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan. 6 ...	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
,, 13 ...	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
,, 20 ...	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
,, 27 ...	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb. 3 ...	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
,, 10 ...	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
,, 17 ...	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
,, 24 ...	56	9	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar. 3 ...	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
,, 10 ...	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
,, 17 ...	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
,, 24 ...	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
,, 31 ...	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl. 7 ...	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
,, 14 ...	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
,, 21 ...	56	5	55	3	84	10	31	5	52	10	70	6	30	11	31	8	59	8
,, 28 ...	58	3	56	3	81	1	32	7	53	5	69	5	31	5	32	4	58	6
May 5 ..	60	5	55	7	77	7	33	3	53	1	64	4	32	4	32	10	54	9
,, 12 ...	61	7	55	5	78	0	34	0	53	5	64	11	32	5	33	1	55	2
,, 19 ...	62	0	55	0	77	11	34	1	52	10	64	10	32	8	33	0	55	2
,, 26 ...	61	11	54	7	78	0	34	8	52	9	64	9	32	7	33	4	54	11
June 2 ...	61	9	53	3	78	0	35	4	53	9	65	11	32	5	33	3	54	11
,, 9 ...	60	1	51	2	78	0	34	5	52	8	67	7	32	4	32	7	55	0
,, 16 ...	56	1	48	10			34	3	50	9			31	9	32	1		
,, 23 ...	52	0	47	6			34	4	49	10			31	9	31	3		
,, 30 ...	49	5	46	3			35	3	49	1			31	1	30	10		
July 7 ...	50	1	46	3			34	7	45	6			31	6	30	8		
,, 14 ...	52	7	48	11			35	8	47	5			31	6	31	6		
,, 21 ...	53	10	51	6			35	10	48	8			32	1	32	3		
,, 28 ..	55	3	53	5			36	1	47	2			31	1	32	5		
Aug. 4 ...	55	4	55	1			35	7	46	1			31	5	32	9		
,, 11 ...	55	2	56	7			37	0	46	11			31	7	31	2		
,, 18 ...	54	3	58	1			39	4	48	0			31	4	30	8		
,, 25 ...	51	11	59	0			38	3	47	1			30	0	31	6		
Sept 1 ...	45	3	59	4			38	1	48	5			26	10	30	5		
,, 8 ...	43	0	59	3			37	11	51	7			26	8	31	1		
,, 15 ...	42	9	59	11			39	0	52	6			26	4	30	9		
,, 22 ...	43	3	59	4			39	8	53	3			26	1	30	9		
,, 29 ...	43	5	58	10			40	4	54	1			26	5	31	1		
Oct 6 ...	44	1	59	2			41	0	54	5			26	5	30	9		
,, 13 ...	45	9	59	7			42	3	53	10			27	1	31	6		
,, 20 ...	48	2	60	9			44	0	53	8			28	1	31	11		
,, 27 ...	50	3	62	10			46	2	54	6			29	1	32	10		
Nov. 3 ...	51	6	66	7			47	3	56	2			30	4	34	0		
,, 10 ...	52	8	69	8			47	5	58	0			30	11	35	8		
,, 17 ...	53	6	70	9			47	11	59	8			31	3	37	8		
,, 24 ...	54	2	70	8			48	7	61	8			31	1	39	7		
Dec. 1 ...	53	7	71	3			48	11	63	1			30	11	41	4		
,, 8 ...	52	10	72	1			47	10	65	6			30	4	44	1		
,, 15 ...	53	11	73	2			47	5	66	5			30	6	45	10		
,, 22 ...	53	10	74	8			47	2	67	3			30	7	46	5		
,, 29 ...	54	9	75	10			47	5	67	5			30	10	47	4		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of May, 1915, 1916, and 1917.

—	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
London ...	59	10	54	9	79	3	34	0	51	2	65	10	33	3	33	9	56	9
Norwich ...	60	2	54	1	77	6	33	1	50	7	64	10	32	1	32	10	54	9
Peterborough	60	6	53	8	77	10	33	6	51	5	64	1	32	5	32	6	54	6
Lincoln ...	61	2	55	0	77	6	32	9	54	0	62	0	32	4	32	11	55	8
Doncaster ...	60	4	55	8	77	11	32	9	52	7	65	1	31	5	32	4	54	11
Salisbury ...	59	9	56	9	77	10	34	8	50	3	65	5	33	4	33	0	54	10

The Weather in England during May.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 5th May:								
England, N.E.	50·9	+4·1	0·03	1	—10	1	6·9	+1
England, E. ...	51·8	+3·4	0·00	0	—10	0	7·7	+1·3
Midland Counties ...	52·8	+4·8	0·00	0	—12	0	7·1	+1·4
England, S.E. ...	52·8	+3·4	0·00	0	—10	0	9·6	+3·1
England, N.W .	51·2	+3·6	0·02	1	—15	1	8·5	+2·9
England, S W. ...	53·2	+4·5	0·00	0	— 16	0	11·2	+5·2
English Channel ...	53·6	+3·0	0·01	0	—13	1	11·8	+4·6
Week ending 12th May:								
England, N E ...	44·7	- 3·6	0·33	9	— 2	3	6·5	+0·5
England, E.	49·3	—0·5	0·03	1	— 9	1	10·1	+3·7
Midland Counties	49·4	- 0·1	0·66	17	+ 7	3	7·5	+1·7
England, S.E. ...	51·9	+0·9	0·07	2	— 7	1	8·7	+2·0
England, N.W. ..	48·7	—0·5	0·72	19	+ 7	4	7·5	+1·4
England, S.W. ..	51·0	+0·5	0·69	17	+ 5	3	7·7	+1·1
English Channel ...	53·6	+1·6	0·51	13	+ 5	2	5·7	—2·3
Week ending 19th May:								
England, N.E. ..	49·6	+0·3	1·01	26	+15	5	3·3	— 2·8
England, E.	54·6	+3·4	0·69	18	+ 7	3	3·2	—3·4
Midland Counties ...	53·2	+1·9	0·85	22	+ 9	4	3·4	—2·6
England, S.E. ...	54·3	+2·1	0·62	16	+ 5	4	3·0	—4·1
England, N.W. ..	51·9	+1·2	0·58	15	+ 2	4	2·7	—3·9
England, S W. ..	51·9	0·0	0·22	5	— 7	3	3·5	—3·4
English Channel ..	53·6	+0·3	0·34	9	— 1	3	5·3	—2·5
Week ending 26th May:								
England, N.E. ...	56·6	+5·9	0·12	3	— 9	2	5·3	—0·9
England, E.	58·4	+5·5	0·30	8	— 3	3	7·1	+0·3
Midland Counties ...	59·0	+6·4	0·56	14	+ 1	3	4·7	—1·1
England, S.E. ...	58·1	+4·3	0·84	21	+10	3	6·5	—0·5
England, N.W. ...	57·7	+5·7	0·44	11	0	3	3·8	—2·6
England, S.W. ...	56·4	+3·4	1·13	29	+16	4	4·4	—2·2
English Channel ...	57·3	+3·2	0·83	21	+10	4	6·5	—1·3

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REPORT OF THE EDUCATION BRANCH FOR THE YEAR 1915-16.

THIS Report deals with the work of the various Institutions and Local Authorities in England and Wales in regard to Agricultural Education during the educational year ended 30th September, 1916, as well as with the payments of grants during the financial year ended 31st March, 1916.*

The Institutions for Higher Agricultural Education with which the Board are connected and the grants paid to each during 1915–16, are shown in Table I.

The payments in the financial year 1915–16 were in respect of pre-war commitments. During the year it was decided to suspend the grants to the Harris Institute, Preston, and to the Royal Horticultural Society's School, Wisley, as a measure of war economy. The Royal Agricultural College, Cirencester, and the Agricultural College, Uckfield, Sussex, were closed in the summer of 1915 owing mainly to the serious falling off in the attendance of students.

All these Institutions have suffered as a result of the War. Many members of their staffs are on military service. At the outbreak of the War many of the students joined the Army, and naturally the number of new students coming forward was much diminished. The two largest residential Institutions, at Wye and Cirencester, have suffered most severely in this respect, and, but for the fact that the former was able to undertake short courses for youths under military age it might have shared the fate of the latter. As noted in the Report for the year 1914–15 (Cd. 8066), the Board were authorised to pay emergency grants in respect of losses caused by the War to certain of the Colleges. The payments on this account are given in Table II.

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* Owing to conditions due to the War this Annual Report is not being issued separately in its usual form.

TABLE I.—*Grants to Institutions for Higher Agricultural Education.*

Name of Institution and Work in respect of which a Grant was paid.	*Amount of Grant.* 1915–16.	1914–15.
Universities and University Colleges.	£	£
Aberystwyth, University College of Wales :—		
Agricultural Instruction	1,000	1,200
Bangor, University College of North Wales :—		
Agricultural Instruction	1,200	1,200
Forestry ,,	250	250
Cambridge, University of :—		
Agricultural Instruction	1,200	1,500
Forestry ,,	250	250
Leeds, University of :—		
Agricultural Instruction	1,200	1,300
Manchester, Victoria University :—		
Agricultural Instruction	300	300
Newcastle-on-Tyne, Armstrong College :—		
Agricultural Instruction	950	1,200
Forestry ,,	250	250
Oxford, University of :—		
Agricultural Instruction	620	1,000
Forestry ,,	250	250
Reading, University College :—		
Agricultural Instruction	1,300	1,300
Agricultural Colleges.		
Cirencester, Royal Agricultural College :—		
Agricultural and Forestry Instruction	1,200	1,200
Holmes Chapel, College of Agriculture and Horticulture :—		
Agricultural Instruction	350	700
Kingston, Derby, Midland Agricultural and Dairy College :—		
Agricultural Instruction	1,000	1,000
Newport, Salop, Harper Adams Agricultural College :—		
Agricultural Instruction	1,000	1,000
Swanley Horticultural College :—		
Horticultural Instruction	500	500
Uckfield, Agricultural and Horticultural College :—		
Agricultural Instruction	500	500
Wye, South-Eastern Agricultural College :—		
Agricultural Instruction	1,300	1,300
Special Institutions.		
British Dairy Institute, Reading :—		
Dairy Instruction	400	400
Harris Institute, Preston :—		
Agricultural Instruction	400	400
Bristol University Agricultural and Horticultural Research Station	450	450
Royal Horticultural Society's School, Wisley, Surrey :—		
Horticultural Instruction	250	250
Royal Veterinary College, London :—		
Veterinary Instruction	—	1,300
	£16,120	£19,000

TABLE II.—*Emergency Grants, 1915–1916.*

Institution.	*Amount of Grant.* £
South-Eastern Agricultural College, Wye	4,500
Harper Adams Agricultural College, Newport, Salop	1,750
Royal Agricultural College, Cirencester	2,000
Oxford University : School of Forestry	150

The attendance of students at these Institutions in the educational year 1914–15 was as follows: Long Courses, 758; Short Courses, 666, as compared with 1,194 and 490, respectively, in the preceding year. The corresponding figures in 1912–13, were 1,284 and 593. As showing the effect of the War on these Institutions, at which the average age of the student before the War was higher, it may be noted that the attendance at Cambridge fell from 150 to 51, and at Wye College from 175 to 90. In some cases the difficulties have been added to by the requisition of college buildings for military purposes.

TABLE III.—*Advisory Grants, 1915–16.*

Name of Institution.	Amount of Grant Provisionally Sanctioned in respect of the Academic Year ending 30th Sept., 1915.	*Amount of Grant Paid in	
		1915–16.	1914–15.
	£	£	£
Aberystwyth, University College of Wales	735	617	492
Bangor, University College of North Wales	1,000	624	1,249
Bristol, University of	1,000	1,146	583
Cambridge, "	1,000	605	754
Leeds, "	975	832	1,190
Midland Agricultural and Dairy College	415	346	406
Newcastle-upon-Tyne, Armstrong College	1,000	600	1,000
Reading, University College ..	1,000	913	996
Wye, South-Eastern Agricultural College	1,000	1,000	1,250
Total	£8,125	£6,683	£7,920

* The amount shown is the sum which was paid in the financial year. The grants are sanctioned in respect of the academic year ending 30th September, but in order to meet the convenience of Institutions, payments on account are made from time to time, and the sum actually paid in the financial year in some instances includes amounts in respect of more than one academic year.

The new buildings at the Armstrong College, Newcastle, have been wholly utilised as a hospital since the beginning of the War, and for a time, rooms in the School of Agriculture, Cambridge, and in Wye College were occupied for military purposes. The only Institution of which the activities have not seriously diminished is the Royal Veterinary College, London.

In last year's Report mention was made of an experimental scheme for training women in milking. This was continued and extended during the year under notice, and a large number of women were trained in the simpler farm operations. The method employed was to grant scholarships at the Colleges for short courses on the College farms.

In addition to their ordinary educational activities the principal Colleges take a part in the supply of advice on technical matters to agriculturists. In some cases members of the staff are wholly engaged in this important duty; in other cases it is combined with teaching. Special Development Grants were paid (see Table III.) to Institutions who employ special officers for the investigation of local problems.

Research Institutes.—Under a scheme approved by the Development Commissioners in 1912, the Board give grants in aid of Scientific Research to certain Institutions, each of which specialises in a specific branch of Agricultural Science. The grants paid in the year under report are given in Table IV.

The depletion of the staffs of these Institutes has also been serious and has necessitated a considerable curtailment of the work. In some cases these Institutions have been engaged on the investigation of problems arising out of the War, notably in the case of the Cambridge Institute of Animal Nutrition. The most noteworthy investigations in progress during the year were as follows:—

1. *Imperial College of Science: Plant Physiology.*—This Institute continued its investigations on the relation of the host and parasite in fungus diseases of plants, a subject which is regarded as the basis of a proper understanding of the problem of immunity to disease in plants. An important advance was made in the knowledge concerning the permeability of plant tissues, more especially in connection with the permeability of seeds, a question of considerable economic importance. The experiments on the effect of electric discharges on field crops were transferred during the year from Leeds University. The results obtained were encouraging, and further experiments on a more extensive scale are now in progress.

2. *University of Cambridge: Plant Breeding.*—In spite of the curtailment of the scientific work caused by loss of staff, work on the economic side was conducted on the usual scale. A large number of new varieties of wheat were produced, principally of spring types, the object in view being to improve the yield of wheats suitable for late sowing. A new wheat named Yeoman was distributed on a commercial scale. This

variety combines yield with "strength," and is likely to prove valuable. Progress was made in the production of improved types of oats and barley. The new barley, "Archplume," was distributed to farmers and is likely to do well.

3. *The Rothamsted Experimental Station: Plant Nutrition and Soil Problems.*—Two-thirds of the staff are either in the Army or have left to take up special work in the Ministry of Munitions. The remainder have been largely engaged in the investigation of special problems arising out of the War. The experiments on the losses of nitrogen occurring in manure-heaps were continued and led to one highly significant discovery, namely, that in certain cases the decomposition of horse manure and of straw is accompanied by the fixation of nitrogen. The studies in soil fertility which have yielded such noteworthy results in past years were continued, with the result that further evidence regarding the importance of soil protozoa in relation to this problem was obtained.

4. *University of Cambridge: Animal Nutrition.*—This laboratory has been of great assistance to the Board in preparing monthly notes on feeding stuffs for publication in the Board's Journal. The continual fluctuations in the prices of feeding stuffs and the appearance of new cakes and meals on the market are a source of perplexity to agriculturists. These notes provide material for solving these difficulties as they arise. Members of the staff were engaged also in investigating the feeding value of British straws. The staff has been seriously depleted and there has been great difficulty in keeping pace with the problems which have arisen.

Special Research Grants.—The Research Institutes are permanently organised for the purposes of research and the substantial grants which the Board make provide the whole or the larger portion of the cost of maintenance. With a view to encouraging research at other institutions a sum of £3,000 per annum has been placed at the disposal of the Board by the Development Commissioners for the financing of investigations of specific problems. These grants are not ordinarily available for providing the salaries of investigators and are intended to provide for special and incidental expenses, and they are allocated on the advice of the Advisory Committee on Agricultural Science. The sum disbursed on this account in 1915–16 was £2,304, as compared with £3,262 in the preceding year.

Research Scholarships.—These scholarships are given with the object of encouraging promising graduates to take up research on the agricultural sciences. Nearly all the scholars have joined the Army and no new appointments have been made since the outbreak of war. The expenditure under this head in the year under report was £1,796.

TABLE IV.—*Grants to Research Institutes.*

Subject of Research and Name of Institution to which the Grant was Paid.	Amount of Grant Provisionally Sanctioned in respect of the Academic Year ending the 30th Sept., 1915.	*Amount of Grant Paid in	
		1915–16.	1914–15.
Research Institutes.	£	£	£
Plant Physiology—Imperial College of Science and Technology	1,709	1,401	1,580
Plant Pathology—Royal Botanic Gardens, Kew	—	3,243	951
Plant Breeding—University of Cambridge	1,733	1,250	2,006
Fruit Growing — University of Bristol	2,500	2,785†	2,310
Plant Nutrition and Soil Problems—Rothamsted Experimental Station	2,850	2,450	2,675
Animal Nutrition—University of Cambridge	2,500	1,778	2,221
Animal Pathology—Royal Veterinary College	2,000	1,196	1,855
Animal Pathology—Board's Veterinary Laboratory	—	896	1,413
Dairying—University College, Reading	2,000	1,812	2,532
Zoology (Helminthology)—University of Birmingham	1,200	889	802
Zoology (Economic Entomology)—Manchester, Victoria University	600	559	400
Agricultural Economics—University of Oxford	1,000	1,000	1,015
Other Research Centres.			
Fruit Growing — South-Eastern Agricultural College, Wye (Malling Fruit Research Station) ..	500	625‡	700
Animal Nutrition—University of Leeds	1,000	1,200‖	1,100
Poultry and Rabbit Breeding—Cambridge University	400	122	—
Glasshouse Crops—Waltham Cross Experimental Station	600	750	—
Total		£21,956	£21,560

* See foot-note to Table III.

† In addition, a grant of £450 in respect of the Bristol University Research Station is included in the Statement of Higher Agricultural Education Grants.

‡ Includes special grant of £100 in respect of the deficit on the working of the Station in 1914–15.

‖ Includes £100 capital grant in respect of building Digestibility Laboratory,

Miscellaneous Grants.—The expenditure under this head during the year under report was £3,467, under the following (principal) heads :—

Chicken Rearing, etc., Demonstrations.

	£
Morden Hall, Cambridge	262
Investigation of Bee Disease	248
Vegetable Drying and Fruit Preserving	650
Swine Fever Research	1,104
Egg Incubating Stations	225
Training of Women	794

Of these, the first three were described in last year's Report. The sum expended on Swine Fever Research represents the preliminary expenditure in connection with a scheme of research initiated by the Royal Society, but subsequently suspended owing to difficulties arising out of the War.

The expenditure on the last two, the Incubating Stations and the Training of Women, represents the cost of two special war schemes, the first ot which was instituted with a view to adding to egg production by distributing improved breeds of poultry; and the second relates to the special scholarship scheme noticed above under the heading of the Agricultural Colleges.

Rural Agricultural Education.—The expenditure on Agricultural Education by the County Education Authorities comes under this head. In nearly all the counties of England and Wales a staff of teachers is engaged in the provision of lectures and advice on agricultural subjects for adults, and many counties also provide classes in technical subjects for non-adults. The head of the county staff is known as the Agricultural Organiser. but there are at present 18 counties without an officer of this description, and there can be no doubt that satisfactory progress cannot be secured unless the work is co-ordinated and directed by a special officer.

The State grants which are available in aid of local expenditures on Agricultural Education are two-fold, (1) " Parliamentary Grants." and (2) Development (Farm Institute) Grants. The Residue Grants are also technically available for this purpose. In the year under report the expenditure under this head was £27,908, of which £12,820 was debitable to the Development Fund.

Early in the year the Board issued a circular urging the importance of confining expenditure on Agricultural Education in the counties within the strictest limits compatible with the maintenance of necessary work, and in response to this appeal, expenditure on demonstrations and experiments, instruction in manual processes and other less urgent operations were in many cases suspended or curtailed.

A suggestion made in the same circular that the making of cheese instead of butter should be encouraged, from the view both of the conservation of the food supply and the economical utilisation of surplus milk, was later developed in the Board's scheme for the establishment of Travelling Cheese-Schools, under which sets of apparatus were purchased by the Board for loan to local authorities who agreed to make new or additional provision for itinerary instruction on this subject. Nineteen authorities availed themselves of this offer, and 33 new schools were set up under the scheme, in addition to five previously in existence; while in several other counties dairying instructresses, previously employed mainly in teaching butter-making, devoted their attention to cheese instead. On the whole, this scheme has been taken up with much enthusiasm and has met with very encouraging success. An extended report on this scheme has appeared in this *Journal*.*

Another important phase of local educational activities during the year was the organisation of instruction for women in milking and the lighter branches of farm work. The scholarships offered by the Board for the training of women at Institutions have already been alluded to; but the increasing withdrawal of male labour from the land, and the inability of many women to avail themselves of institutional courses, made it necessary to supplement these facilities. Private farmers were enlisted in many cases for this purpose, and much has been done in this way to overcome the prevalent conservatism in regard to the employment of women labour in the fields.

On the other hand, there was a considerable falling-off in the number of organised courses of instruction—a fact which was, however, partly compensated for by a general demand for special lectures dealing more directly with problems of cultivation arising out of war conditions. As a rule, the Agricultural Organiser, where he existed, was employed as Secretary to the County War Agricultural Committee, and it was generally found possible to combine with advantage his activities in this capacity with his ordinary educational and advisory functions. Other members of the county staffs joined the Army in large numbers, so that a good deal of extra work was thrown on the depleted staffs remaining, in spite of the reduction of portions of the regular work already noted.

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* See November, 1916, p. 767, and December, 1916, p. 897.

As pointed out in the Report for 1914–15, schemes for building farm institutes in certain counties are held in abeyance until after the War. During 1916, however, the extension of the Cumberland and Westmorland Farm School at Newton Rigg was completed, while the new buildings of the Midland Agricultural College at Sutton Bonington were practically finished. Of the £25,000 from the Development Fund sanctioned in respect of the latter scheme, £15,000 came from the Farm Institute Fund.

Particulars furnished by the local authorities* show that 292 organised day courses were held in the year ended 31st July, 1916, as against 341 in the previous year, while the attendance of students numbered 2,963 as compared with 3,544. The greater part of these courses were attended by women and were held in connection with Travelling Dairy Schools. Courses of instruction in farriery for soldiers were held in several counties.

Under the head of Evening Schools and Classes, 171 courses, attended by 3,227 pupils, were held, the corresponding figures for the previous year being 297 and 4,975. Lectures of a popular nature were given in nearly all the counties, the number reported to the Board being 4,511 as against 6,387 in 1914–15. Instruction by means of classes in Manual Processes (hedging, ploughing, milking, etc.) was given in twelve counties, the total number of meetings being 644; in the previous year, 2,071 meetings were held in 21 counties. The returns from eight Institutions providing residential courses of the Farm Institute type show that instruction was provided for 469 pupils. The attendance at six such Institutions in 1914–15 was 332.

Summary of Grants.—The total amount distributed by the Board in the form of grants for agricultural education and research in the financial year 1915–16 was £98,646. During the last five years the figures were as follows :—

	£		£
1911–12	28,690	1914–15	96,628
1912–13	32,434	1915–16	98,646
1913–14	67,939		

The grant paid in 1915-16 included a sum of £66,415 from the Development Fund, the corresponding sum in the preceding year being £62,917.

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* Except Montgomeryshire.

The purposes to which the grants of 1915–16 and the corresponding grants of 1914–15 have been applied were:—

	1915–16. £	1914–15. £
Educational Grants to Universities and Colleges	16,120	19,000
Grants for Advisory Work	6,683	7,920
Grants to Research Institutes and other Research Centres	21,956	21,560
Grants for Special Research and other Investigations (including Miscellaneous Development Schemes and Emergency Experiments)	6,371	6,295
Research Scholarships (including Expenses of Selection)	1,796	4,825
Grants for Farm Schools, Technical Classes, Local Lectures, etc.	27,908	23,681
Capital Grants-in-Aid of the Establishment of Farm Schools	13,594	7,300
Grants towards the Expenses of Advisory Councils	1,160	1,946
Grants for Forestry Advice, Research and Experiments	3,058	4,101
	£98,646	£96,628

CIDER FRUIT FOR TABLE USE.

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THE need of raising the production of home-grown food to the highest degree possible under existing conditions is now recognised. While every effort is required to obtain the maximum yield of the staple foods of the country, any produce of potential food value deserves attention. Among such material which is normally not taken into account for feeding purposes the cider fruit crop deserves consideration.

Hitherto cider apples as a class have been regarded as suitable only for making cider, but the pressed pomace, or residue of the pulp left after the juice has been extracted for cider-making, has been used more or less generally on the farms in the cider districts as a food for cattle. This substance was dealt with recently in an article in this *Journal*[*] and need not, therefore, be considered here.

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[*] Vol. XXII., p. 851.

The question as to whether or not the best use is being made of cider apples in the present emergency by converting them into cider is in many respects analogous to that of barley and beer. It may be pointed out that serious injury to the cider industry need not be apprehended if a portion of the cider fruit crop is diverted to other uses. The consumption of cider is likely to be affected by the imposition of a duty on that beverage. Although just now the restrictions on beer have caused an increased demand for cider, the provision of other uses for cider apples should not only do no harm to the cider industry, but tend to avoid waste of fruit and loss to the grower.

The difficulty of finding any satisfactory alternative outlet for cider fruit is due to the nature of the article itself. Broadly speaking it is unpalatable to eat in the raw state partly on account of the leathery texture of the flesh and partly because of its more or less astringent bitter flavour and frequent lack of acidity. Most attempts to cook the apples have ended in failure, the tissues remaining tough and leathery. To a limited extent they can be used as food for stock, and it is intended shortly to deal with this side of the subject in a separate article.

Hitherto in this country the only direction in which cider apples appear to have been used to any extent other than for making cider, has been for jam-making. In seasons when the market apple crop has been deficient, jam manufacturers have bought considerable quantities of certain kinds; but they appear to limit their purchases to the sharp or acid varieties.

It may be here explained that there are three classes of cider apples, namely, the sharps or sours, the sweets and the bittersweets. These are distinguished by the chemical composition of their juice. Apple juice of the sharp class contains normally more than ·45 per cent. of malic acid; that of the sweet class less than ·45 per cent. of malic acid and less than ·2 per cent. of tannin; and that of the bittersweet class less than ·45 per cent. of malic acid and more than ·2 per cent. of tannin. Table apples, dessert or culinary, resemble the sharp class in acidity, but generally contain much less tannin. Table I. illustrates these points of difference between typical cider and table apples.

While apples generally can be separated into two main groups, *i.e.* table apples and cider apples, and the latter again fall naturally into the three classes already mentioned, the classification is a purely arbitrary one based on certain chemical standards. There is no essential difference between a cider apple and a table apple, and cases could be instanced of recognised cider varieties which might rank as table sorts of at least average merit, and *vice versa.* The question of utilising the crop of cider fruit for human food does not appear to have been seriously considered. Probably the unpalatability of the average cider apple in the raw state and the apparent impossibility of cooking it satisfactorily have sufficed to divert attention from it. The fact, however, that jam manufacturers use the sharp varieties in years of scarcity indicates that these at any rate can be cooked adequately, and that the relatively high percentage of tannin which many of them possess as compared with the average table variety does not affect too seriously the flavour of the product.

TABLE I.—*Composition of Juice of Table and Cider Apples,* 1909.

Name of Variety.	Specific Gravity.	Percentage Composition of Juice.	
		Malic Acid.	Tannin.
Table varieties :—			
Bramley's Seedling	1·045	·55	·084
Cox's Orange Pippin ..	1·059	·62	·062
Lane's Prince Albert ..	1·045	·84	·092
Newton Wonder	1·044	·65	·084
Wellington	1·043	·86	·060
Worcester Pearmain ..	1·040	·30	·092
Sharp cider varieties :—			
Cap of Liberty	1·055	·92	·186
Foxwhelp	1·059	·75	·190
Frederick	1·053	·83	·076
Kingston Black	1·062	·56	·114
Sweet cider varieties :—			
Old Cadbury	1·056	·15	·172
Slack-ma-Girdle	1·050	·19	·108
Sweet Alford	1·055	·16	·120
White Jersey	1·055	·19	·044
Bittersweet cider varieties :—			
Chisel Jersey	1·060	·18	·364
Royal Jersey	1·058	·24	·440
Silver Cup	1·060	·19	·312
White Close Pippin	1·048	·18	·244

That being so, it appeared worth while investigating the cause of the bad cooking qualities of the sweet and bittersweet varieties. It seemed to be tacitly assumed that the reason why these would not cook was that the tannin caused the tissues of the pulp of the apple to become leathery and prevented them from softening properly during the cooking. On that assumption many of the sharp varieties used by the jam manufacturers should fail to cook satisfactorily; but since the latter, while refusing generally to purchase sweet and bittersweet apples, appear to be willing to take any sharp sorts, it does not seem probable that any serious difficulty is experienced in cooking any of those to a fine pulp. Moreover, many sweet varieties contain very little tannin, but nevertheless cook badly. Hence it seemed likely that the cause of the difficulty in cooking lay in another direction.

During the course of recent work at Long Ashton on the pectin compounds of apples it was found that the yield of soluble pectins from cider apple pomace was increased by treatment with a dilute solution of a suitable acid. In this case, after all water-soluble pectin bodies had been removed by repeated washing with cold and hot water, digestion of the insoluble residue with dilute sulphuric or tartaric acid resulted in a further yield of pectins in solution, accompanied by a considerable softening and disintegration of the residual pulp. This suggested the idea that the leathery character of the cooked tissues of sweet and bittersweet apples might be due to the presence of pectin compounds which remained more or less insoluble after cooking.

A trial was therefore carried out with apples of the Dabinett variety, a well-known bittersweet type, the juice of which contained approximately ·2 per cent. malic acid and ·4 per cent. tannin. These were peeled and cored and then sliced and boiled for 15 minutes in a dilute solution of tartaric acid. At the end of that time the slices had almost completely disintegrated and had boiled down to a soft pulp of nearly uniform consistency. As a control some of the fruit was boiled similarly in water; but in this case even after prolonged boiling the slices retained their original form and remained in a leathery uncooked condition. The two samples were then tasted for comparison. The difference between them was most striking. So far as the cooking was concerned, the acid-treated fruit was thoroughly satisfactory. The pulp was uniformly well-cooked and in that respect was quite up to the standard of the average kind of culinary apple. The slices boiled in water, on the other hand, were tough and leathery and completely unsatisfactory from the culinary point of view. As regards flavour, the addition of acid gave a pleasant briskness to the taste and relieved the natural insipidity of the bittersweet character. It also to some extent masked the bitterness and astringency produced by the presence of the somewhat large amount of tannin in the variety selected for trial. The tannin character, however, remained clearly discernible, particularly to palates unaccustomed to cider and cider apples, and the addition of sugar failed to obscure it completely although of assistance in this respect. The addition of acid also appeared to intensify the " apple " flavour of the fruit, and during the course of the cooking the pleasant, fruity, apple-like aroma given off by the fruit seemed to exceed appreciably that produced during the cooking of the average table variety. Further tests were then made in a similar way with a considerable number of varieties of sweet and bittersweet apples, those of the sharp type being omitted since it was known that they would cook satisfactorily. The approximate composition of the juice of some of the varieties tested is given in Table II.

TABLE II.—*Composition of Juice of Cider Varieties Used in Cooking Trials.*

Name of Variety.	Specific Gravity.	Percentage Composition of Juice.	
		Malic Acid.	Tannin.
Broadleaf Jersey	1·059	·30	·39
Cremière	1·057	·34	·18
Dabinett	1·059	·17	·35
Dove	1·046	·11	·16
Ecarlatine	1·047	·08	·12
Eggleton Styre	1·055	·20	·14
Harry Masters Jersey	1·057	·22	·42
Médaille d'Or	1·050	·22	·58
Sweet Alford	1·057	·14	·17
Yarlington Mill	1·048	·23	·30

Is was found that in no case was there any difficulty in cooking the fruit satisfactorily when a dilute solution of tartaric acid was used. The results when water alone was used were variable. Generally the slices remained leathery as described in the previous case; but in a few instances where fruit on the over-ripe side was taken the cooking was somewhat more satisfactory, and in one instance approached the standard of an average culinary variety. Probably in such cases the advanced stage of ripeness of the fruit was associated with changes in the pectin compounds, the greater part of which by that time had been converted into water-soluble forms.

The character of the flavour in the tests where acid was used varied considerably according to the kind of apple. Speaking generally, all varieties of the sweet class, *i.e.* sorts in which the amount of tannin in the juice did not exceed ·2 per cent., gave a cooked product which did not differ materially in flavour from that of any ordinary culinary variety. In fact in most cases an uninitiated person tasting it would fail to detect that a culinary sort had not been used. With varieties of the bitter-sweet class the results differed according to the amount of tannin contained in the respective kinds. When the percentage was not much above ·2, the tannin flavour was barely noticeable, even in unsweetened samples. As it approached ·4 it became more marked, and over that quantity it was distinctly pronounced and not easy to mask by sweetening. The "apple" flavour in all cases was very well marked.

The appearance of the pulp after cooking differed according to variety. Many sorts cooked perfectly white and translucent. Others showed a yellower tint, which was, however, not sufficiently marked to detract from their appearance. So long as the cooking was carried out in the manner about to be described, the results in this respect equalled those obtained with ordinary culinary varieties. It is important, however, to follow more or less closely the method given on account of the tendency of cider apples to develop a brownish colour somewhat rapidly after they are cut owing to the oxidation of the tannin compounds. This persists and spoils the appearance after cooking unless suitable precautions are adopted.

The method of cooking used in the laboratory trials was as follows :—A glass beaker of suitable size was filled to about one-third of its capacity with a solution of tartaric acid made up at the rate of 1 oz. of the crystalline acid to a pint of water. This was kept boiling vigorously throughout the cooking trial. The apples were next dealt with, being peeled and cored and each cut into five or six pieces as quickly as possible, the sections being thrown into the boiling liquid as soon as they were prepared. The beaker was filled nearly to the brim with the sliced fruit and then covered with a glass plate to check the escape of the steam In most cases ten or fifteen minutes cooking sufficed, the fruit being by that time reduced more or less to a pulpy condition. The actual length of time required for cooking varied somewhat according to the variety of fruit used, its state of ripeness, and the thickness of the individual slices; but even in the most refractory cases the cooking was completed in less than half-an-hour. When a stronger solution of acid was used, the requisite time of cooking was reduced, while a weaker solution necessitated generally longer cooking.

Since individual taste as regards degree of acidity varies considerably, it will doubtless be found most satisfactory to modify the strength of the acid solution according to taste; and in this connection it may be observed that the amount of sugar required subsequently for sweetening purposes is largely affected by the quantity of acid used. This again is a matter of individual taste. When the quantity of acid used is relatively small, many will probably find that no added sugar is necessary for sweetening. For bittersweet apples with a pronounced tannin flavour, the latter is best obscured by taking a rather large quantity of acid and a proportionately large amount of sugar. When sugar is required, it is essential that this should not be added until the cooking is completed, otherwise the cooking quality of the fruit is impaired. If added as soon as cooking is finished, it will readily dissolve in the hot pulp and give uniform sweetness. It is not desirable to reduce the amount of liquid used in the method mentioned above. Well-cooked pulp almost invariably absorbs the whole of it, and if less is taken there is a risk that a part of the fruit may be charred as a result of heating the cooking vessel directly over the source of heat. This can be obviated by using a double vessel, such as an ordinary porridge saucepan, for the cooking; but in this case the temperature is reduced and a longer period of cooking is required. For domestic purposes an enamelled saucepan, or an aluminium or copper one, serves admirably in the place of the glass vessels which were used in the laboratory trials. For table purposes the cooked pulp can be used alone or admixed with other fruit as ordinary stewed fruit; or it can be utilised for apple tarts, puddings, etc. In the latter case this preliminary cooking is desirable, although not absolutely necessary if a small quantity of the acid solution is used in the tart or pudding also.

The pulp is equally serviceable for jam or jelly making, either alone or in combination with other fruit; but it must be cooked as above before the addition of any sugar. When used for jam making with other fruit, if the latter is fairly acid the addition of any acid solution is unnecessary, the acidity of such fruit ensuring adequate cooking, provided that sufficient is used. Apple jelly can be very simply made by boiling the fruit whole in the acid solution until it is thoroughly cooked and begins to split. The clear liquid is then poured off and sugar dissolved in it at the rate of 1 lb. for every pint. This is then boiled again until it is concentrated sufficiently to set on cooling.

For jam making on a commercial scale apples are now used largely, their value as a source of pectin to assist the setting of various other kinds of jam being considerable. The use of cider apples of the sharp class for this purpose has already been referred to above and is well known to the trade. Cider apples of the sweet and bittersweet classes, if treated on the lines just indicated, may now be employed to equal advantage for the same purpose, and not only the fruit itself but also the pressed pomace, *i.e.* the solid residue of pulp remaining after the juice has been extracted for cider-making. This has been done recently on a commercial scale with considerable success.

The kind of acid used in the initial experiments was tartaric, which occurs naturally in grape juice and many fruits; but any other organic acids found in fruits appear equally efficient and can be substituted, if more convenient. Of such acids citric, the natural acid of lemons, and malic, the natural acid of apples and pears, are of common occurrence; but the cost of the latter in a pure state is prohibitive. Both tartaric and citric acids, on the other hand, are still cheap enough to use in the small quantities required without adding appreciably to the cost. Where fruit or fruit juices are available these can be used with advantage in the place of the acid itself, the requisite quantity being easily ascertained by trial. Thus, orange or lemon juice answers admirably, the juice of one lemon mixed with sufficient water to furnish the required amount of liquid being adequate to cook some few pounds of apples. Again, a few cider apples of the sharp class or culinary apples, or their juice serve equally well.

The chemical action of acid on the apples during cooking has been investigated. Without going into details here, it can be stated that it consists primarily in the conversion of comparatively insoluble pectin compounds into others readily soluble in the acid liquid used. There is also a solvent action on the starch present in the tissues of the fruit.

It is evident that all cider fruit could be utilised for human consumption in case of necessity. From calculations published recently* it seems probable that the average total crop in

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* This *Journal*, Vol. XXII., p. 851.

England is not less than 200,000 to 250,000 tons. The average crop in France according to recent estimates* approaches 2½ million tons. The proportion of fruit of the sharp class to that of the bittersweet and sweet classes is not high. In the West of England it is certainly well below 1 : 2, probably appreciably less than 1 : 3. In France it is undoubtedly lower still. A very considerable addition to our possible food resources is thus now available. In apples the chief constituent of direct nutritive importance is sugar, which in the case of the average cider apple is distinctly greater in quantity than in an average table apple, frequently exceeding 10 per cent. of the total weight of the fruit. The beneficial effects of this fruit in other ways on general health are recognised, and its value therefore as an article of diet is quite inadequately expressed in terms of its content of substances of ordinary nutritive significance.

The most obvious objection likely to be raised against the use of cider fruit as food is that of the small size of the individual apples. A very fair proportion of the cider fruit crop, however, could be obtained in the form of apples of a size which would compare favourably in that respect with many of the cheaper grades of culinary apples regularly placed on the market. A little care in selection at the time of gathering the fruit would furnish a large supply of medium-sized fruit. The smaller specimens could be used in jam manufacture, just as is the case now with undersized culinary apples.

Any drawback in respect of size is counterbalanced by the low market value of the fruit. In a season of scarcity such as the last cider apples were obtainable without difficulty at £3 to £4 per ton; and in 1914 and 1915 the price was less than one-half that mentioned.

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* *Le Cidre et le Poiré*, December, 1916.

THE DETERMINATION OF THE COST OF PRODUCTION OF FARM CROPS.

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Definition.—In discussing the subject of this article it is desirable in the first place to come to some understanding as to what is implied by the term "Cost of Production." Taking a general case, it will be admitted that the cost of production of any farm crop comprises at least (1) all labour expenses (manual, horse and machine) of cultivation, seeding, manuring, liming, harvesting and transporting, either to where consumed on the farm or to where delivered on the market, together with (2) the cost of seed, manures, etc., actually used by the crop, and (3) a proportionate share of the overhead expenses, such as rent, rates, taxes, insurance and general or establishment charges. In the opinion of most economists, it must also include (4) a charge for interest on the working capital and (5) a proportionate share of the expenses of management. As regards (1) the only item which calls for special remark is the cost of transport or marketing expenses. It is customary to estimate the cost up to the time the crop is harvested and stored on the farm, and then to speak of the figure so obtained as the cost of production. Now the cost of marketing a crop varies directly and considerably according to the distance from the market, whereas the charge for rent and certain other items also varies considerably, but *inversely* as the market-distance; and, further, it is generally understood that the net profit is represented by the excess of monetary returns over cost of production. Hence, unless the total cost is taken, erroneous impressions would be created as to the net financial returns or profit. It follows that, for a given crop, the cost of production will differ according to whether it is consumed on the farm or sold. When consumed, the cost might be called the *Farm Cost of Production*; when sold, the *Sale Cost of Production.*

Nothing need be said at this stage regarding items (2) and (3), but a few words are necessary as to (4) and (5). According to some authorities, no charge for interest on capital can properly be included in the cost of production. The question is much too complex to be discussed here; but the writer is strongly of opinion that no estimate of the cost of a farm crop is complete unless allowance has been made for interest on the necessary capital directly involved in its production. Similar remarks apply to the charge for expenses of management.

The cost of labour under (1) must include the market value at current rates of wages of any work done by the farmer himself, as on a small or medium-sized farm where the farmer acts the dual rôle of manager and worker. If now, in the case of a large farm, on which the farmer's time and energies are fully occupied with the actual management, no allowance is made for this item, it is clear that a fair comparison cannot be made between the cost on a large and on a small farm. Or again, the farmer's place may be taken by a bailiff or grieve whose salary must be charged against the various farm products.

To sum up, *the Cost of Production should be such a figure as will represent the minimum net price at which a certain crop can be sold or otherwise realised if the farmer is to get* (*a*) *a fair return on his invested capital and* (*b*) *a reasonable remuneration as manager of the business.* Any other conception is likely to result in misleading impressions being spread as to the net profit to be derived from crop-production as compared with other industries; no comparisons as to net profits can legitimately be drawn between the large and the small farm, between the farm managed by the farmer and that managed by a bailiff, and so on, unless this definition of cost of production is strictly adhered to.

Labour as a Factor in Cost of Production.—It is well known that the labour-bill is a predominant item in the cost of production of any crop; so much so that it merits preliminary and special consideration. Manual labour is generally bought at a known or easily calculated cost but, on the other hand, it usually happens that both horse and machine labour are produced on the farm at a cost which admits of less easy computation. It is desirable, therefore, to indicate (*a*) how the total cost of labour can be ascertained and (*b*) how this cost can be accurately distributed over the various products on which it is expended.

Manual Labour.—As regards the cost of manual labour, it is only necessary to point out that it must include not only the cash wages of hired workers but also the value of allowances or perquisites, the contribution of the farmer under the National Insurance Act, and, in addition, the value of any work done by the farmer and by members of his household. In all cases of doubt, the calculation should be based as far as possible upon what such labour would cost the farmer if he were under the necessity of having to pay for it all in cash at current rates of wages. Suitable daily records must be regularly made out in order to distribute the total cost over the various products. In the case of regular workers, engaged by the year or half-year, the suggestion may be made that it is not sound in principle to charge their labour at a uniform rate per day or per hour all the year round—as is commonly done. Under this method, we find that regular skilled workers cost, say, 5*d*. per hour during hay and grain harvest, while less experienced workers cost 6*d*. per hour. It would be more rational to charge the former with at least as high a rate as the latter and thus enable the cost to be reduced against less critical operations such as ploughing, dung carting in winter and so on, and especially against non-remunerative work, such as cleaning harness, tidying the stack-yard, etc. It is possible, however, that any difference in the cost of a certain crop which might emerge under the two methods would fall within the limits of unavoidable error, in which case the simpler method might be preferred.

Horse Labour.—Various methods of charging the cost of horse labour have been put forward. It has been suggested that it should be "sold" to crops, etc., at a rate varying according to the "value" of the work done. Thus, a day's drilling of corn would be charged at one rate per day or per hour, a day's dung carting in winter at another rate, and so on. Several objections might be urged against this method, but the fundamental objection is that it would in all probability result in showing either a profit or a loss on work-horses which, in the writer's opinion, is far from being sound book-keeping. The generally accepted method is to charge horse labour at its cost of production, just as manual labour is charged at its purchase price.

The chief item in the production of horse labour is, of course, the cost of the horse's food, and here an interesting and difficult problem presents itself. Farm horses are largely fed on oats, hay and straw, in the production of which horse labour is largely used. Hence, to attempt to show how the actual cost of both horse labour and crops may be determined would be to reason in a circle. A starting point in the circle must be fixed somewhere and it is certainly most convenient as well as most rational to commence with horse labour. The writer strongly advocates that oats and hay should be charged at their market value on the farm at the time of consumption, while straw should be priced at a nominal figure which may or may not approximate closely to its farm market value.

Two chief reasons may be given in support of this proposal. In the first place, unless saleable foods are charged at their market value the actual monetary advantage to be gained by the substitution of mechanical for horse labour will not be apparent. The comparative cost of machine labour can only be determined after making allowance for the return received from the sale of oats and hay which would otherwise be fed to horses. Secondly, in dealing with market prices we are dealing in facts, whereas any other basis for figuring the cost of such foods would be largely supposititious. Further, readers of this *Journal* will have noticed that farmers have been advised to economise in the cost of feeding farm horses, that is, in the cost of horse labour, by substituting purchased concentrates for a certain proportion of the oats usually fed, and this recommendation indicates that oats are being charged at their market value.

In obtaining the cost of horse labour, account must also be taken of the cost of litter and of overhead expenses, such as shoeing, depreciation and upkeep of harness, stable utensils, share of rent, rates and taxes, insurance, veterinary attendance, depreciation (if any), interest on invested capital and share of general and management expenses. In some cases a charge may also be made for the cost of attendance, but since this will usually be part of the work of the regular horsemen or ploughmen care must be taken to make a corresponding deduction from the cost of manual labour. On the other hand, a deduction must be made from the total cost for the value of the manure produced, the estimation of which will be discussed later. Generally, foals should be kept out of the horses' account, although in certain cases this would not be so, *e.g.* where young horses are bred expressly for farm use, to obtain a cheaper supply of horse labour.

The method of arriving at the net cost of horse labour having been agreed upon, it is next necessary to arrange for the careful recording of the number of hours worked as a whole and also of the distribution of the labour over the various crops. The usual method of procedure is to divide the net cost by the total number of hours worked, thus getting the average cost per horse-hour, and this rate is then charged alike in all farm operations. Similar remarks apply here as were made in the same connection under manual labour.

Mechanical Labour.—The cost of mechanical labour will of course be based upon the cost of upkeep (fuel, replacement and repairs) of the machinery, the rate of depreciation and the interest on the invested capital. The cost of a machine hour can be determined by the same method as for horse labour and a charge made against each crop according to the machine labour expended on it. Wherever expensive, modern machinery, such as a motor-plough, is in use, great care is necessary in reckoning the charge to be made for it, otherwise misleading impressions may be formed as to the relative economy of horse and machine labour.

Method of Stating Cost of Labour.—In certain cases, it is sufficient to figure the total cost of each form of labour, but usually more than this will be necessary, and for this reason: it is generally recognised that the cost of a dressing of dung or of lime should not be wholly charged against the crop to which it is actually applied, but must be distributed over several crops according to the benefit received by each. Now, the cost of such a dressing comprises not merely the price of the materials but also the cost of transit to the farm and the cost of application to the land. A dressing of 2 tons per acre of ground limestone may cost £2 10s. as to material, but the total cost may quite easily amount to £3 or more. while the total cost of a dressing of dung largely consists of the labour costs of carting and application. Hence it follows that the labour records must be compiled and the cost-sheet arranged so as to show as accurately as possible the total cost of the various factors of production—cultivation, manuring, liming, etc.

Cost of Production of the Swede Crop.—It is now possible to examine more closely the data which are required in the preparation of reliable cost-sheets for the various farm crops. In the first place, by way of example, the case of the swede crop will be taken, consideration of which will introduce most of the difficulties which will be met with in such work.

The Cost-Sheet.—Reduced to its simplest and ultimate form, the cost-sheet for swedes would be. framed on the following lines:—

A—Direct costs (prime cost) per acre:—

(1) Cost of ploughing.
(2) Cost of seed and sowing.
(3) Cost of singling.

(4) *Net* cost of preparing the land (including autumn cultivations) and of tillages during the growing season.
(5) *Net* cost of lime, haulage and application.
(6) *Net* cost of artificial manures, haulage and application.
(7) *Net* cost of dung, haulage and application.
(8) Cost of lifting and carting to where consumed or marketed.

B—Indirect costs per acre :—

(9) Proportionate share of rent, rates, taxes and insurance.
(10) Proportionate share of general and management expenses.
(11) Charge for interest on average outlay (invested capital).

It will be a great advantage and conduce to more accurate results if the records are kept for a fairly large field entirely under swedes, and it is highly desirable that records should be kept on the same farm throughout a number of consecutive seasons in order to show the effect of the weather or season upon the cost of production. From a practical point of view, the most useful figure is the average cost of production per ton on the same farm over a number of seasons, although from an economic point of view a general average over both farms and seasons is also desirable. A few explanatory remarks may now be made on each of the above items.

Nos. (1), (2) and (3) call for no special attention, the cost being entirely chargeable against swedes.

(4) *Cost of Tillage before and after Sowing.*—This item includes, of course, the cost of harrowing, cultivating, ridging, etc., before, and of scarifying, drill-harrowing and grubbing, weeding, etc., after sowing. The reason for keeping these costs separate has already been indicated. The swede is one of the "cleaning" crops in the rotation and, ordinarily, one of the objects in growing it is to get the land thoroughly broken up and cleaned. Hence, it would be obviously unfair to charge this crop with the whole cost of cleaning, since the work is done for the benefit of practically all the crops in the rotation. The question at once arises : upon what principle can we reckon the proportion actually chargeable to swedes ?

As a starting point, we might assume that the land was perfectly clean, friable and easily broken up, in which case the whole cost of the above work might be made a charge on swedes. But even here it must be realised that the swede crop—as a crop—exerts a beneficial effect upon succeeding crops, although it is impossible to translate this effect into terms of money. At the other extreme, we find land which is foul or difficult to work, or both, and which requires a maximum amount of preparation before it is fit for swedes. In this case, it will readily be admitted that only part of the cost can in fairness be charged to this crop. On the other hand, it must also be kept in mind that swedes are benefited by the growth of preceding crops, such as pasture, oats and wheat. Bearing these considerations in view, it is the business of the investigator, having regard to the special circumstances of each case, to distribute as fairly as possible the cost of these operations amongst swedes and the succeeding crops in the rotation. The proportion to be carried by swedes may vary from as high as 95 down to as low as 50 per cent. With the greatest of care, the correct answer to such a problem must still be largely a matter of opinion.

(5), (6), (7) *Cost of Manures and Lime.*—Our aim here must be to determine what proportion of the total cost of manuring and liming is utilised by swedes, or at any rate exhausted during their year of growth. As regards artificial manures and lime, the question is simplified by the fact that the actual cost of these materials is known, while the cost of haulage, mixing and application can, with suitable records, be reliably determined. The experienced worker should also be able to distribute with a reasonable degree of accuracy the total cost over the various crops benefited by such applications, thus arriving at the net cost of artificial manures and lime for swedes. Similar remarks, except as regards distribution, would apply to purchased dung or town manure.

Wherever (home-made) farmyard manure is used, however, we have first to estimate the actual "cost" of the manure applied, and then to distribute this cost over the various crops benefited. As to the former, there is much difference of opinion. There are those who hold that only the labour costs of carting and application should be reckoned, the manure itself being looked upon as part of the soil which has been changed into its present form through the agency of crops and live stock. This method has the merit of simplicity, but the serious drawback of great inaccuracy. It would result, for example, in the same charge being made for a ton of manure made by stock getting only turnips and straw as for a ton made where the stock had been heavily fed with concentrated feeding stuffs, while a ton of fresh, unrotted and "strawy" manure would be valued at the same rate as a ton of well-rotted and concentrated manure. A second method which has been suggested is to charge the dung at its "cost." This does not represent the actual cost of production, since it appears impossible to determine the actual cost of each of the three elements in the continuous cycle formed by crops, stock and dung, but is based upon the manurial values of the foods consumed by the stock producing the dung, that is, the charge for dung is based upon its *value* as a manure. On the Continent again, the manure-value of dung has been determined by carrying out very numerous local field experiments over a number of years, in order to compare the returns on different soils and with different crops from dung and purchased artificials, thus giving an *objective* value to the dung instead of a *subjective* value as obtained under the second method.

The question is much too intricate to be fully discussed in such an article as this. Although the writer considers the Continental method to be entirely sound in principle and also possible of application in this country, he does not recommend it meanwhile, because sufficient experiments of the kind indicated have not yet been made. In fact, there seems at present no better way of figuring the charge to be made for dung than to accept the arbitrary though fairly well-standardised figures which are commonly used in valuations between outgoing and in-going tenants. The charge per "yard" or per ton for the dung itself, will of course vary according to its "quality," and also according to the current prices of artificial manures, while the total charge per acre will depend upon the quantity applied and the labour costs of haulage and application.

The method here suggested must not, however, be too rigorously applied. Exceptions will occur where the home-grown foods have been wholly charged to stock at their farm market value instead of at their cost of production, as will generally happen, and also where a certain proportion of the dung used has been purchased. In the former case at least, the dung should be valued on a market basis by figuring what it would cost to bring dung of a like quality on to the farm in the event of all the crops being sold off and no stock kept.

As to the proportion of the cost of a dressing of dung which should be charged against the swedes, no hard and fast rule can be laid down. It is recognised that it will vary very widely according to a variety of conditions—soil, rainfall, system of farming, kind of stock producing the dung, other manures applied, extent of dressing and so on—and each case must be judged on its merits. On poor, sandy soil, and with a moderate dressing, as much as 80 per cent. of the total cost might be carried by the swedes, while on loams in good condition and with a heavy dressing the proportion charged might be as low as 40 per cent.

Consideration of this question of manure-costs makes it perfectly clear that the qualified investigator into problems of cost of production must have not only a knowledge of the principles of book-keeping and cost-accounting but also a wide experience of field experiments on manuring, liming, etc.

(8) *Cost of Lifting, etc.*—The swede crop may either be eaten off on the ground, lifted and stored for consumption on the field or at the steading, or lifted and marketed. In any case, this group of expenses will include the cost of the work done up to the time the crop is realised. The actual cost of feeding—cutting or pulping—is. however, generally made a charge against the live stock. In certain cases, a deduction may be necessary at this stage for the value—feeding or manurial or both—of the swede " tops," but the estimation of this item is not a very serious matter.

(9) *Rent, Rates, Taxes and Insurance.*—The method of dealing with this charge can be best illustrated by means of a concrete example. Suppose an ordinary arable farm of 300 acres is rented at £300 per annum, that the total rates and taxes paid by the farmer amount to £50 per annum, and that insurance (not including life assurance and insurance of farm workers) equals £20—a total of £370. Now it must be understood that the whole of this is not a farm expense. The income tax is purely a personal levy—it is a levy on the farmer's income, not on the farm—and has first to be deducted. Further, part of the rent, rates and other taxes is chargeable to the farmer as a personal expense against the use of the farm dwelling-house. Suppose the income tax is £20 and that the farm dwelling-house is valued at £20 per annum, this leaves £330 to be charged against the farm. The insurance can generally be accurately distributed over crops, live stock and establishment, while the remaining £310 is the actual expense to be carried by the land or crops and the farm buildings or live stock, etc. The charge for rent, etc., against the buildings should be based upon the interest on the capital outlay. In this case, the buildings (excluding dwelling-house and cottages) might have cost £1.000. If we allow 5 per cent for interest and sinking fund, the charge for rent would be £50, say £55 inclusive, leaving £255 as the actual charge against the land. It is most unfair to crops to burden them with the whole of the expense, as is commonly done. Lastly, this £255 must be distributed over the various fields according to the quality (crop-producing powers) of the soil in each. Thus, we would have so many acres at 25s. per acre, so many at 22s., 20s., and so on.

Where the quality of the soil varies, as it usually does, it is essential that the charge for rent. etc., should also vary, and it will often happen that the variation as between the best and the worst soil is as much as 10s. per acre.

(10) *General and Management Expenses.*—In compiling cost records it is important that the amount entered as general expenses should be kept as low as possible and the total for the year will be distributed over the various crops according to the relative importance of each in the farm economy. As to management, the question is: how can we determine the total allowance to be made to the farmer for managing the farm? Obviously, it cannot be based upon the skill of the farmer—that is, on the net returns—for that is a very variable item and just as the *cost* of manual labour does not depend upon the skill of the worker so may it be said that the cost of a manager does not depend upon his efficiency. Let us assume, however, that a farmer has several farms, one of which he manages himself while each of the others is in the hands of a bailiff or grieve. It would appear to be quite reasonable to make the farmer an allowance on the basis of the salaries paid to his managers, and the same principle can be applied to practically all cases. On large farms, the whole of the farmer's salary as manager would be reckoned as expenses of management, but on small and medium-sized farms, part of the cost would be counted in the manual labour. In ordinary book-keeping it is, perhaps, more usual not to make any charge for management, where it is done by the farmer, and the net profit then shown is called the farmer's "labour income," but in determining costs of production it is imperative that this item should always be included in the records. The total charge for management will of course be distributed over crops, etc., according to the time and care required by each.

(11) *Interest on Capital.*—This may be calculated at the rate of 4 or 5 per cent. per annum on the average outlay on the crop. The rate will vary according to (*a*) the state of the money market, (*b*) the risk involved with the particular crop under consideration.

The Acre Basis.—It is not intended in this article to deal with the various forms of records which are necessary in determining the cost of production of farm crops but a word may be said here as to the unit which should be adopted for comparison purposes. In ordinary cases, all the data should be reduced to an *acre-basis*, rather than to a yield-basis—that is, so much per acre rather than so much per ton or quarter or barrel.

The cost of producing a crop does not vary according to the yield, and with certain crops the cost will be very little more for a large than for a small one. By introducing the yield we introduce a very variable factor, and this would give rise to misleading conclusions as to the economy which had been exercised in production. In one district swedes may cost 8*s.* per ton to produce, in another, with similar soil, etc., and other conditions, the cost may be 12*s.*, but the higher cost of the latter may be due to causes over which the farmer has no control and not to any lack of skill in management. Comparisons on a yield-basis would be permissible and preferable only when made over a long period of years.

Probable Error in the Result.—It is evident that the figure thus obtained for the cost of production of the swede crop must not be looked upon as being mathematically correct. In more than one item, the charge made is partly a matter of opinion and, consequently, different workers would arrive at different results with the same case. This difference may be called the "probable error," and should always be reckoned with. It will be large for some items in the cost sheet and comparatively small for others.

The Cost Sheet Completed.—On completion, the cost sheet for the swede crop would possibly appear something like the following :—

Nature of Expense.	*Net Cost per Acre.*			*Probable Error.*	*Minimum Cost.*			*Maximum Cost.*		
	£	*s.*	*d.*	Per cent.	£	*s.*	*d.*	£	*s.*	*d.*
(1) Ploughing	0	10	0	5	0	9	6	0	10	6
(2) Seed and sowing	0	3	9	—	0	3	9	0	3	9
(3) Singling	0	8	0	—	0	8	0	0	8	0
(4) Other tillages	0	12	6	10	0	11	3	0	13	9
(5) Lime	0	10	0	15	0	8	6	0	11	6
(6) Artificial manures	1	0	0	10	0	18	0	1	2	0
(7) Farmyard manure	1	10	0	20	1	4	0	1	16	0
(8) Lifting and storing	1	0	0	5	0	19	0	1	1	0
(9) Rent, rates, taxes	0	15	0	10	0	13	6	0	16	6
(10) General and management expenses	0	10	0	10	0	9	0	0	11	0
(11) Interest on outlay (4 per cent)	0	5	0	—	0	5	0	0	5	0
	£7	4	3	10	£6	9	6	£7	19	0
Cost per ton (yield 15 tons)		9	7	10		8	7		10	7
,, ,, (,, 25 ,,		5	9	10		5	2		6	4

The records have shown that the cost per acre amounts to £7 4*s.* 3*d.* ; further, we can be reasonably certain that the net cost is not less than £6 9*s.* 6*d.*, nor more than £7 19*s.*, and there is a high degree of probability that it lies very near £7 4*s.* 3*d.* This method of interpretation serves to emphasise the fact that where the sources of unavoidable errors are so frequent every endeavour must be made at every point in the investigation to obviate all sources of avoidable errors.

Other Data Obtainable.—The yield per acre having been ascertained, the *cost per ton* can at once be determined, while it will also be possible and desirable to reckon from the records :—

(1) the number of hours of manual labour and of horse labour required to produce (*a*) an acre and (*b*) a ton of swedes,

(2) the distribution throughout the year of manual and of horse labour, and

(3) the proportion which the cost of each of the factors in production—manual labour, horse labour, manures, rent, etc.—bears to the total cost. This would enable a statement to be prepared showing, for example, the effect on the cost per acre of a 20 per cent increase in the cost of hand labour, compared with the same increase in the cost of manures purchased or in rent. In this article, however, it is impossible to do more than merely mention such aspects of the question but they are none the less important. Indeed, it may be said that the main benefit in cost-records lies not so much in the actual results but in the careful and detailed analysis of the various factors which have brought about the results.

The above principles can be applied, broadly speaking, in the determination of the cost of production per acre of any farm crop, and in many cases the result will be much more mathematically accurate than in the case of swedes. In certain cases, special difficulties will be met with, but these should not prove insurmountable.

Grain Crops.—In translating the cost per acre into cost per unit of yield, a very important question arises in the case of all grain crops and also of seeds hay. Suppose the total cost per acre for a crop of *oats* amounts to £7, ***how is this cost to be distributed between grain and straw?*** No strict rule can be laid down but three typical cases may be considered, *i.e.* (1) where both grain and straw are readily saleable, as in the vicinity of large towns, (2) where the crop is grown chiefly for the grain with the straw as a useful by-product, and (3) where a principal object is to get a good yield of straw of high fodder quality, as in the western dairying districts.

The first case presents little difficulty. It may be assumed that the farmer desires to get as large a yield of straw as is compatible with a high yield and quality of grain and, further, that his desire will be influenced by the relative demand, *i.e.*

market value *on the farm*, for the two products. Hence it is perfectly fair and reasonable to distribute the cost according to the relative farm market value of grain and straw. If the total cost per acre is £7, the total market value of the grain £10, and of the straw £4, then the cost of the grain would be $\frac{10}{14}$ of £7, and that of the straw $\frac{4}{14}$ of £7, from which the cost per quarter and per ton, respectively, can easily be found. If the market value of the grain rises, then the proportion charged to the grain will also rise, and this is quite sound, since the higher the relative value of the grain the greater importance will the farmer attach to this product.

In the second case, however, the farmer looks upon the straw very largely as a by-product in grain-production. Normally, he has no intention of selling, partly because of the low *farm* market value caused by the high cost of marketing, and partly because he has a better use for the straw on the farm. In other words, the farmer would grow less straw if he could do so without affecting the yield of grain, and hence the grain should be made to carry a higher proportion of the cost than under the method first given. In the dairying districts again, the farmer desires a large yield of good quality straw not so much because of its possible market value as its fodder value, and his estimate of the relative value of straw would be higher than that formed by a consideration of the relative market values.

It would appear that, in the second case, the value given to the straw should be rather less than the farm market value, while in the third it should be somewhat higher, after which the relative cost of grain and straw can be calculated as already explained.

The use of arbitrary figures in such cases is unavoidable, and it is admitted that the above suggestions are largely tentative. Whatever method is adopted, the guiding principle should however be to distribute the cost according to the relative importance attached by the farmer to each product, starting from the assumption that if straw had no value the whole cost would be charged to the grain and working up to the case in which great stress is laid upon both the yield and quality of the straw. A serious difficulty in practice is to estimate with any considerable degree of accuracy the actual yield of straw per acre, but with the expenditure of a little extra time and labour this difficulty can be surmounted.

In conclusion, the writer wishes to make two important general observations. Firstly, it will be apparent that any error made in the determination of the cost of production of crops consumed on the farm will be included in the cost records for live stock and their products, and should the error be very great it might lead to entirely erroneous conclusions being drawn as to the relative economy of crop-production, cattle-feeding, milk-production, and so on. Secondly, although in this article the crop has been taken as the unit this has only been done for the sake of clearness and brevity. The writer is very strongly of the opinion that *the true economic unit in crop production is the rotation,* and not the single crop.

THE NUTRITIVE VALUE OF EDIBLE FUNGI.

SUGGESTIONS are frequently received that the use of edible fungi should be encouraged, particularly in times of shortage like the present. Such suggestions are largely founded on the widespread popular belief that the nutritive value of mushrooms and other edible fungi is very great. It is now known that this is not the case, and in view of the well-known risks attaching to the use of fungi as food by persons not very well acquainted with the plants, it is desirable that the true facts as to their place in the diet should be more widely understood.

The idea that fungi are highly nutritious originated in the fact that analyses have shown them to contain a relatively large proportion of nitrogenous compounds. It was formerly customary to assume that the total amount of nitrogen present represented "crude protein," the valuable formative constituent of such foods as meat, fish, beans, etc.; hence it is chiefly as a proteid or "flesh-forming" food that fungi have been recommended.

There are, however, several sources of error in this assumption. The total amount of nitrogen present is not all in the form of proteids; much of it may represent simpler compounds of little or no nutritive value; moreover, in the fungi a certain proportion of nitrogen enters into the composition of the indigestible substance forming the cell-walls, or "fibre," and is thus of no use to the human body. Furthermore, it does not follow that the whole of the proteid matter present can be digested, and so become available for the nutrition of the body.

Numerous analyses of edible fungi are on record. The figures vary considerably even in the same species, possibly according to the age of the specimens examined or other factors.

In general, fungi contain in the fresh state from 80 to 94 per cent. of water, the average being about 90 per cent.; in this respect they correspond with succulent vegetables such as cabbage, turnips, etc. This fact alone must render the nutritive value of fresh fungi very low.

The total nitrogen content as given in different analyses varies from about 1 to 8 per cent. of the dry matter; but according to König* from 16 to 37 per cent. of the nitrogenous substances present are not of a proteid nature. Furthermore, the proteids of fungi appear to be less soluble than those of other plants, and experiments have shown that a considerable proportion resist digestion. According to Mörner†, the total amount of nitrogen present in the dry substance of certain species, its distribution as proteid and non-proteid, and the proportion of the nitrogen which he found to be digestible are as represented in Table I.

TABLE I.—*Nitrogenous Compounds in Mushrooms* (*Mörner*).

—	Total Nitrogen.	Extractive (non-proteid) Nitrogen.	Proteid-Nitrogen.	Digestible Proteid-Nitrogen.
	Per cent.	Per cent.	Per cent.	Per cent.
Lepiota procera (Parasol mushroom), cap ..	6·23	2·02	4·21	2·99
Agaricus campestris (Common mushroom), cap ..	7·38	2·49	4·89	3·64
Agaricus campestris (Common mushroom), stem ..	6·02	1·98	4·04	2·88
Boletus edulis, cap	3·87	1·14	2·73	2·10
,, ,, stem	3·30	0·95	2·35	1·76
Morchella esculenta (Morel)	4·99	0·81	4·18	2·19

The percentages are calculated on the dry substance.

From these results it follows that the available protein in the fungi is considerably less than was formerly estimated, when the total nitrogen content was taken as representing digestible proteid substances. Even lower figures than those of

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* König. *Die menschl. Nahrungs und Genussmittel*, 1904, 4 Aufl., II., p. 945.
† C. Th. Mörner, in *Zeitschr. f. physiol. Chemie*, X, 1886, p. 503.

Mörner were obtained by Mendel,* as exemplified in the case of *Coprinus comatus* and *Morchella esculenta*.

TABLE II.—*Nitrogenous Compounds in Mushrooms* (*Mendel*).

—	Total Nitrogen.	Extractive Nitrogen.	"Crude proteid-" Nitrogen.	Digestible proteid-Nitrogen.	Indigestible proteid-Nitrogen.	Digestible proteid-(N × 6·25)
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Coprinus comatus	5·79	3·87	1·92	0·82	1·10	5·12
Morchella esculenta	4·66	1·17	3·49	1·44	2·05	9·00

The percentages are calculated on the dry substance.

Winterstein and Reuter, on the other hand, have indicated a much higher digestible proteid content for *Boletus edulis*.† It is obvious that there is need for further work in this direction. Most investigators, however, appear to be agreed that the amount of available proteids in fresh fungi approximates to that of other fresh vegetables; it is far below that of dried beans and peas, and fungi therefore cannot be considered as a substitute for meat.

The fungi contain very little fat. The figures given for various species vary from 0·12 to 0·93 per cent. of the fresh substance, and these figures probably include some free fatty acids. Carbohydrates, however, are relatively abundant, although starch, the chief carbohydrate of other plants, is not present. The carbohydrates may amount to 50 per cent. of the dry matter, or at most 10 per cent. of the fresh substance, and include glycogen, mannite, trehalose, glucose, etc., as to the nutritive value of many of which little is known. A varying proportion of fibre is present, which is useless as food.

The ash varies from 0·48 to 2 per cent. of the fresh substance. It contains chiefly potassium and phosphoric acid, with varying quantities of other mineral substances.

Summarising the results obtained from the analysis of various edible fungi, and comparing them with other foods, it is obvious that mushrooms can in no sense be regarded as substitutes for flesh-forming foods, such as meat. It may be noted that the common mushroom (*Agaricus campestris*) is richest in proteid substances of all the species examined.

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* L. B. Mendel, in *Amer. Journ. Physiol.* I., 1898, p. 232.

† E. Winterstein and C. Reuter, in *Zentralbl. Bakt.*, Abt. 2, Bd. xxxiv, 1912, pp. 571-572.

Even so, however, its proteid content is no higher than that of cabbage or potatoes, and in total nutritive value it is far inferior to the latter on account of its poorer carbohydrate content.*

Fungi, therefore, cannot be ranked with the essential foods. At the same time they are not to be looked upon as absolutely worthless. They may be made to serve a useful purpose as food accessories. Their agreeable flavour renders them especially suitable as flavourings or for use along with other more nutritious foods; variety and palatability are well known to be important factors in the question of diet. From this point of view, however, *purchased* mushrooms in this country are usually not an economical addition to the menu; but where edible fungi can be gathered or obtained very cheaply they may take their place in adding variety to the diet.

Too great care cannot be exercised with regard to the use of edible fungi by persons not very familiar with the different species. The determination of species of Agarics, or gill-fungi, is by no means easy, and even mycologists of some experience may sometimes be deceived by close resemblances between edible and poisonous species. There is no test which can be used for the detection of poisonous varieties, and the soundest advice which can be given to the would-be fungus-eater is not to experiment unless he is absolutely certain of the species with which he is dealing, and never under any circumstances to eat fungi which are not perfectly sound and unattacked by insects. In cases of doubt expert advice should be asked.

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* Potatoes contain about 22 per cent. carbohydrates, calculated on the fresh substance.

Pig-keeping in Towns and Villages: A Practical Guide.*

PEOPLE who possess a fair-sized garden or allotment can usually arrange to keep at least one pig.

The essential conditions are :—

1. Selection of type of pig popular in the district.
2. Cheap but weatherproof sty with adequate ventilation.
3. Regular and sufficient feeding.
4. Systematic collection of house refuse to cheapen cost of upkeep.
5. Plentiful supply of vegetable matter.

Type of Pig.—The small pig-keeper should select the type of pig that is the most popular in his district, the reason being that should he wish to sell he will probably have to rely on a local buyer. *This is important.* Pork, rather than bacon, should be the aim.

For making into pork, Berkshires, Middle Whites, Lincolnshire Curly Coated and Gloucestershire Old Spots, are preferred by many pig-keepers, but any good quality sow of local breed crossed with one or other of the breeds referred to will generally answer the purpose.

A start should be made with a newly-weaned pig, about eight weeks old. An extra shilling or two spent in a good pig will be amply repaid. It must be an animal with a vigorous constitution—a greedy, lusty fellow, active on his legs, lengthy and round in shape.

Housing.—No elaborate structure is necessary. The main essentials are comfortable and clean conditions, with a dry bed, suitable ventilation, and the absence of draughts. The foundation must be dry, and the sty should, if possible, face the south. In the higher parts of the walls openings should be provided through which the passage of air may be easily regulated, in order that the temperature may be kept as even as possible throughout the year. A cheap, wooden erection would serve, or the walls may be built of brick or concrete, or wood on a brick foundation, and the building may often take the form of a lean-to. It should be high enough to obviate all difficulty in cleaning out. A roof of wood covered with thick tarred felt will suffice to keep out cold and wet. The floor is the most important part of the sty. Concrete is the most suitable material. This should be left rough to afford a foothold. Part of the floor, sufficient to provide bed accommodation for the pig, should be covered with a movable wooden platform. Hard bricks also make a good floor. To ensure drainage the floor should slope gently to the front of the sty. The drainage should not be wasted. but should pass into some convenient receptacle, or into a sunk dung-pit for use in the garden with the pig's manure.

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* This article is Special Leaflet No. 71, about to be issued, and copies of which will not be sent to contributors to the *Journal.*

Bedding.—Where straw is not available, dried bracken, grass and leaves make thoroughly efficient bedding. Every effort should be made to provide an abundant supply, especially in cold weather.

Feeding.—For several weeks after weaning the pig should receive its food in a moderate sloppy condition, slightly warm if the weather is cold. The food may consist of kitchen waste (a very small quantity until the pigs are about 12 weeks old), and a little coconut cake (soaked overnight), or sharps, and sufficient water should be added to give the whole the consistency of gruel. A newly-weaned pig will usually require about 2 lb. of food per day, 1 lb. of which should consist of coconut cake or similar material.

The young pig should be fed regularly three times a day, the food being gradually increased, as much being given at each meal as it will readily clear up. Dried blood, meat, and fish scraps, a little at a time, are desirable.

It is important that vegetable food should form part of the diet at all seasons. Young grass from the wayside, weeds from the garden, and similar material will all be picked over by a young growing pig. In the dead of winter reliance must be placed chiefly on small potatoes, and on parsnips, turnips, artichokes, etc.

Forced Feeding.—When the pig is about 100 lb. in weight feeding should be rather more forced. Meal may be given more freely, and vegetable foods reduced.

Another important point to remember is the necessity of supplying a regular allowance of gritty material, preferably small coal or wood ashes, or, failing these, earthy turf.

A pig should weigh from 170 lb. to 180 lb. from 5 to 6 months old, when it should be ready for killing. The amount of food required at this stage will be from 5 to 6 lb. of meals or their equivalent daily, and the dressed carcass should weigh from 130 lb. to 140 lb.

Rations.—A few examples of rations are appended. In each case Ration 1 represents a mixture of feeding-stuffs in common use in the past, while the alternative (Ration 2) shows how by using other feeding-stuffs the diet may be cheapened, and restricted mainly to materials not required for human food.

Along with the foods specified it is intended that the pigs should receive a moderate allowance of house refuse, or such roots and green forage as may be available. The precise amounts will depend on the kind and quantity of the other food material available. In the case of pigs of 14–16 weeks and over it may be possible in some cases to feed them almost wholly on kitchen waste. In the winter months roots should be boiled and mashed and the meals incorporated immediately before feeding. About 4 lb. of waste potatoes or sugar beet, or 5 to 6 lb. of parsnips, or 8 to 10 lbs. of carrots, turnips, cabbages, etc., are equivalent to 1 lb. of mixed cereal meals for pig-feeding. Such vegetable material should be used in the proportion of 4 or 6 lb. to 1 lb. of meal. For pigs up to 3 months old, at least a little skim or separated milk is most beneficial, and when procurable at about one-sixth of the cost per lb. of mixed meals, it will invariably prove economical (1 gal. of milk weighs approximately 10 lb.). Whey is also useful but is worth appreciably less than skim milk.

Rations for Pigs of 25–60 *lb. Live Weight.*

(1) ¾ lb. Middling
¼ ,, Barley Meal.

(2) ¼ lb. Bran .. .. ..
¼ ,, Coconut cake or Linseed Cake Meal ..
½ ,, Sharps .. ..
or
¼ lb. Fish Meal.
¼ ,, Maize Gluten Feed.
½ ,, Sharps or Bran.

Rations for Pigs of 69–100 *lb. Live Weight.*

(1) 1 lb. Sharps.
1 ,, Barley Meal.

(2) ¼ lb. Middlings .. ..
¾ ,, Dried Grains ..
½ ,, Palm-nut Cake, Coconut Cake or Bean Meal .. ..
¼ ,, Fish Meal .. ..
or 2 lb. Maize Gluten Feed.

Rations for Pigs of 100–180 *lb. Live Weight.*

(1) 1 lb. Sharps.
1 ,, Barley Meal.
1 ,, Maize Meal.

(2) 1 lb. Maize or fine Midlings .. ..
1 „ Dried Grains .. ..
1 „ Palm-nut Cake, Coconut Cake or Bean Meal .. ..
} *or* 3 lb. Maize Gluten Feed.

In an experiment* with pigs recently conducted in Yorkshire, it was shown that palm kernel cake and extracted palm kernel meal can be safely used as food for pigs in proportions ranging up to about one-third of the total ration. Finely-ground palm kernel cake would appear to be about equal in feeding value to fine sharps (thirds) and appreciably superior to extracted palm kernel meal.

Collection of House Refuse.—Householders unable to keep pigs themselves may assist by setting aside edible waste material for the feeding of pigs belonging to other people. Where a number of people, either individually or in combination, *e.g.*, a group of allotment holders. erect a piggery, a trolley would be the best means for collection. The garden and kitchen will supply a considerable proportion of the animal's food. Refuse from butchers, poulterers, fishmongers, fruiterers, greengrocers, from dairies, hotels, boarding-houses and other dwelling houses, can similarly be turned into valuable meat.

The necessary organisation and collection of waste material might well be undertaken by local corps of women as voluntary war work.

House Refuse Feeding.—Swill or dish-water should not be used as it contains washing soda or salt, both of which, if given in excess, are injurious to the animal's health. The refuse should be collected and used while fresh and sweet, and if it can be boiled or steamed first, all the better.

Out-door Pig-keeping.—Those who have access to grazing or woodlands are advised, wherever possible, to allow their pigs full run of the land available. The Board specially desire to urge this practice in view of the present shortage of, and need for economy in. feeding-stuffs for live-stock. Full information as to the possibilities of out-door pig-keeping is given in Technical Bulletin No. 9, Series C, of the Food Production Department of the Board. Copies of this Bulletin may be obtained free of charge and post free on application to the Department at 72, Victoria Street, London, S.W. 1.

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* *Journal of the Board of Agriculture*, December, 1916.

Growing Wild White Clover for Seed.*

MANY owners and occupiers of grass land hesitate to break up pasture, because of the difficulties anticipated in again laying the land down to grass, should arable farming become unprofitable after the War. To a certain extent misgivings are warranted, for many of those who have attempted to lay down land to grass have found that the formation of a satisfactory pasture has been difficult and expensive. But the difficulties of the past have frequently been caused by an unwise selection of seeds, and recent experience indicates that under suitable treatment the formation of a good pasture is neither so expensive nor so tedious a matter as it is generally supposed to be. It has been proved, for example, that if proper use be made of wild white clover and phosphatic manures the formation of pastures on medium and strong soils may be relatively easy and inexpensive.

Under present conditions agriculturists should not hesitate to break up those pastures which in the opinion of the County Agricultural Executive Committee are required for corn growing. Should subsequent experience indicate that a return to grass is desirable there is reason to anticipate that there will be no great difficulty in forming a satisfactory pasture.

The following particulars respecting the growing of wild white clover for seed are given with the object of popularising the use of this clover, which should form the basis of most of our pastures.

The great value of wild white clover has been definitely established by trials in many parts of the country.† It produces perennial plants, and so gives better results than commercial white or Dutch clover, which dies out more quickly. At Cockle Park, where extensive trials have been conducted, substantial benefits have been obtained from its use as early as the aftermath of the first year's hay, and close, clovery herbage now continues to be produced from the plant up to the eleventh year after sowing.

It is a common experience that the inclusion of wild white clover in a seeds mixture has established pastures of high feeding value within 18 months after sowing, and has been the means of producing large and nutritive crops of hay for some years in succession.

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* This article is a reproduction of a Bulletin issued by the Food Production Department.

† References to Reports dealing with the results of trials are given at the end of the article.

Up till now the supplies of wild white clover seed have been limited, but the demand is stimulating the supply. It is of the utmost importance that as much seed as possible should be harvested, and it is hoped that more farmers will take steps to grow their own supplies.

Manuring.— The most satisfactory results have been obtained by applying 7 to 10 cwt. of high-grade basic slag per acre in the autumn following sowing, after harvesting the cover crop. Dressings of dung or of nitrogenous manures develop the grassy herbage at the expense of the clovers, and, therefore, should not be used where it is desired to encourage wild white clover. On light soils known to respond to potash a dressing of salt (about 4 cwt. per acre), or potash manure if available, should be applied in addition. If the land is mown for hay, a further dressing of 8 cwt. of high-grade slag per acre, or its equivalent of low-grade slag, should be applied every third year. If the land is pastured, 5 cwt. every third year is probably ample.

In addition to increasing the productivity of the herbage, wild white clover is an important factor in accumulating fertility in the land, and should always be included in seeds mixtures for leys of two or more years' duration.

Distribution.—Wild clover is present to some extent on most pastures ; it is also common on roadsides and on some types of hill grazing. It is a creeping plant of dwarf growth, and is, therefore, easiest to harvest when associated with the smaller grasses only. Most of the wild white clover on the market is at present harvested on the Weald Clay in Kent, Surrey, and Sussex, but it has also been successfully harvested in Gloucestershire and in many of the southern counties. Small lots have also been obtained occasionally from Wales and from Northumberland and other northern counties. The seed should be harvested only from fields that have been down to grass for many years.

Selection of Field and Early Treatment.—Poor pastures with but very little grass are usually selected. These should be dressed with about 7 cwt. per acre of basic slag in the autumn or early winter, and should be grazed over with cattle till the end of May, in order to keep down the grass. The clover should them be fit for harvesting in August or September. If slag is available it may be applied with advantage up to the middle of June. As an alternative, fields which have already received slag, or are naturally full of white clover, should be selected.

Harvesting the Crop.—The crop should not be cut until it is ripe. In most cases the ordinary hay mowing machine, with the knives set as low as possible, will be found quite satisfactory, but when the crop is very short it may be necessary to cut with the scythe.

Opinions differ as to the best methods of handling the crop after it has been cut. Some growers treat it in a similar manner to an ordinary hay crop, but to avoid wasting the seed it is advisable to take certain special precautions. The crop should be shaken as little as possible and handled gently. After cutting, the produce should be collected into small cocks, which are turned at intervals until uniformly dry. The forks should not be dug into the cocks when turning or lifting, but should be run lightly under them ; a four-tine fork or a long-pronged stable fork is most suitable for the purpose. The carts or wagons should be sheeted and the cocks carefully loaded when sufficiently dry. Great care must be taken not to allow the clover to heat in the stack. Small lots may be stored in the barns. One successful grower on a large scale leaves his produce on the wagons under a Dutch barn for a day or two before unloading. This grower never makes his stacks more than 3½ to 4 yd. wide, and for every 2 yd. of length he inserts a specially-constructed ventilating passage. Whether stored in stacks or in a Dutch barn the material should be carefully ventilated

Threshing and Cleaning.—The crop may be threshed by an ordinary corn-threshing machine. A sheet is placed below the machine to collect the clover heads and any seed that may be knocked out. Subsequently the heads are passed through a special clover-dressing machine known as a huller or pugger. The machine commonly used for dressing red clover will only turn out a rough sample. often containing large numbers of trefoil capsules. Most of the larger impurities can be removed by passing the seed over a riddle with a mesh fine enough to let the clover seed pass. The sample will then be suitable for ordinary use. although it will no doubt contain a certain quantity of trefoil seed and the smaller clover and grass seeds. To obtain a pure commercial sample it is necessary to employ a special machine. Such a machine may be purchased, or arrangements made to send the rough seed to a firm that specialises in dressing.

Yield per Acre.—The yield of seed per acre varies considerably. Farmers are generally quite satisfied with 2 to 3 cwt., although larger yields are not unknown.

" Once Grown " Wild White Clover.—" Once Grown " wild white clover has given quite satisfactory results. It is produced from leys in which true wild white clover is the only clover used in the seeds mixture. The seed is harvested when the white clover has fully established itself, that is to say, after two or three years. It is of the greatest importance that the ley should receive no nitrogenous manures, but a good dressing of basic slag (say 10 cwt. per acre) should be applied after the corn has been harvested. The " Once Grown " wild white clover would be harvested in the manner already described. The field should be grazed until about the 1st of June and the clover cut early in September.

Some growers take an early cutting of grass and clover hay about the middle of June. In this cutting the grasses will preponderate, but the second crop will produce chiefly wild white clover.

The seeds mixture sown should consist of about 4 lb. of wild white clover per acre, and suitable grasses for a four years' ley. The latter will keep down weeds and ensure a good sward.

The Seed of Wild White Clover.—The seed of wild white clover is on the average much smaller than that of commercial white or Dutch clover. Samples frequently contain a large percentage of " hard " seed—many samples with 10 per cent. and a few with more than 20 per cent. have been met with. Samples of home-saved seed have been tested by Biffen, Mercer and Jenkin in which the hard seed has varied from 39 per cent. to 80 per cent. Farmers who harvest their own stocks can make a large proportion of the " hard " seed germinate by spreading the mass of seed thinly on a table and rubbing it lightly with some object possessing a flat, gritty surface. Biffen has proved a piece of bath brick to be effective, while Mercer has found that shaking the seed in a box lined with glass paper answers the purpose.

The seed of natural wild white clover differs from that of " Once Grown " wild white clover in the proportion of impurities it contains. The chief impurities met with in wild white clover harvested from old indigenous pastures are: bird's foot trefoil (up to 5 per cent.), yellow suckling clover (up to 16 per cent.), crested dog's tail, bent, and sometimes the meadow grasses with pasture weeds like tormentilla. woodrush, self heal and rib grass—weeds that would naturally come from permanent grass.

" Once Grown " wild white clover usually contains the seeds of self heal and rib grass, with impurities like the geraniums, madder and bladder campion so often associated with temporary leys; it sometimes contains also a high proportion of red clover seed.

Owing to the high price of wild white clover seed it should only be purchased under a definite guarantee of purity and not in mixtures. When the farmer grows his own seed it is not, however, necessary to subject it to elaborate cleaning operations since the other leguminous herbs contained in home-grown samples are valuable in themselves and the amount of really harmful seeds is usually slight.

It is, however, essential that those farmers who harvest their own seed, and are unable to put it through adequate dressing machinery, should treat it by one of the simple methods described in order to ensure that a high proportion of the "hard" seed will grow.

REFERENCES.

GILCHRIST, Professor Douglas A.: *Wild White Clover* (Farmer and Stockbreeder Year Book, 1917.)

Trials of Wild White Clover (Jour. Bd. Agric., Vol. XVI., No. 9, December, 1909; and Vol. XXII., No. 11, February, 1916).

Annual Guides to Cockle Park (from 1906 till 1916).

JENKIN, T. J.: *Ordinary White Clover Seed versus Wild White Clover Seed* (Jour. Bd. Agric., Vol. XXIII., No. 12, March, 1917).

MERCER, W. B.: *Grass and Clover Seeds* (College Bull. No. 15, Armstrong College, Newcastle-upon-Tyne).

MALDEN, W. J.: *Harvesting White Clover* (The Farmer and Stockbreeder, Vol. XXIX., No. 1402, New Series, 7th August, 1916).

M'ALPINE, Professor A. N.: *Wild White Clover* (Trans. High. and Agr. Soc. of Scotland, Fifth Series, Vol. XXVII., 1915).

PORTER, JOHN: *A Big Stride in Agricultural Improvement* (The Hereford Times, 1916. 6*d*. net.).

VOELCKER, Dr. J. A.: *Report on Experiments conducted in 1888 by Local Agricultural Societies in conjunction with the Royal Agricultural Society (Saltney Experiments)* (Jour. Roy. Agric. Soc., Vol. XXV., 1889).

THE following Notes have been communicated to the Board by the Agricultural Organisation Society:—

The Urmston and District Allotments Association.

In no direction is the co-operative principle more adaptable or more useful than in the matter of allotment associations. One of the most striking instances of rapid success achieved co-operatively by allotment holders is the Urmston and District Allotments Association, Ltd. Urmston is in Lancashire, a suburb of Manchester, and lies in the area covered by the North-Western Branch of the Agricultural Organisation Society. The Association, which was formed during the spring of 1916 and registered under the model rules of the Agricultural Organisation Society, presents many interesting features, a study of which may prove useful to other associations now existing or to be started.

Some Advantages.—Co-operation in allotment holding may have other advantages besides those arising directly out of the collective renting of a piece of land, although these latter in themselves are considerable. When land is rented individually or "piecemeal," whether it be through a local authority or direct from a landowner, the interest of the landlord in the enterprise often ends with the collection of the rent. In similar circumstances the interest of the plot-holder in the welfare of his neighbouring plot-holders will probably be slight and not necessarily sympathetic. Where the land is rented as a whole by an association of allotment holders a common interest is at once set up; the mere holding of the land co-operatively creates the need for a system of governing it co-operatively. From this condition of affairs, given a body of intelligent and enthusiastic men, all sorts of benefits will gradually accrue.

Managing Their Own Affairs.—It may fairly be claimed that the success of most allotment associations is proportionate to the degree of co-operation shown in their management and development. From the outset the Urmston Association has displayed a fine co-operative spirit.

The entrance fee was fixed at 1*s.*, with 6*d.* extra for rules and membership card. Each member also holds a 5*s.* share, on which he has to pay up 1*s.* A commencement was made with a field of 5 acres. The land is held direct from the owner at a fair rental, which allows the Association to sublet at the rate of 350 square yards for an inclusive sum of 10*s.* per annum. This charge amply covers management expenses, purchase of fencing, the buying of utensils, etc., for the joint use of members.

A very desirable and effective form of fencing, namely, cleft chestnut, was selected and put up by the members in their leisure time. Apart from the fencing, a tool-house, eight barrows, two pairs of scales, and other requirements were obtained collectively during the first year.

Although the Urmston men had foremost in their minds the aim of producing payable crops from their ground, they did not allow this desire to overrule all others. They determined that so far as was possible their allotments should be convenient and comfortable to work, and pleasing to look upon; that they should have educational and recreative as well as more material uses. Therefore the Committee did not attempt to extract rent from every available inch of land. They planned out cartways 9 ft. wide, giving easy access for manure, etc., to every plot; and they left a large central plot unallotted to be held as the joint property of all the members and utilised for experimental or charitable purposes.

Rapid Progress.—It is a delusion often found among novices that ordinary ground takes a long time to get into decent order, and that it is an expensive business. A body of enlightened and energetic men working together, however, can do wonderful things. They did them at Urmston. The ground was only broken up in March, 1916, but in the same season splendid crops of peas, potatoes, and other vegetables were raised by the holders, the majority of whom had little or no previous experience of gardening.

So marked was the success of the venture from the outset that the area of the land originally acquired was soon found too restricted for the number of applicants, and three other fields have now been rented and developed. About 10 acres in all, at an average rent of £3 per acre, are now occupied by 160 active or working tenant-members holding land from the Association.

The Association has recently decided to encourage gardeners and allotment holders who have other land to become "associates" by the payment of an annual subscription of 1*s*. Strict membership will therefore be confined to tenants, but associates will have the same privileges for trading, buying seeds, etc., and already about one hundred associates have signed on.

Better Business.—In order that the main needs of the members may be dealt with co-operatively in the most effective and systematic manner, a Trading Committee was appointed to advise and make contracts, etc., on behalf of members.

Considerable economy in time and money was speedily effected by this arrangement. To ensure a cheap regular supply of manure for each member a contract was entered into by the Association with the local industrial co-operative society, which undertook to deliver its whole manurial output to the Association.

Lime, salt, and artificial manures have also been ordered collectively; and arrangements have been made with seedsmen and dealers for the supply at liberal discount terms for small seeds and other gardening requisites. Large quantities of seedlings and plants were bought and distributed at prices far below those at which single buyers would have been able to obtain them. Over 800 fruit trees and bushes were purchased and planted in the first year.

Enlightened Co-operation.—The Urmston Association has done good service by allying itself with the Board of Agriculture and Fisheries in the fight against wart disease of potatoes, which in many parts of the country (and notably around Manchester) has presented enormous difficulties to the professional and amateur gardener alike. Orders were placed by the Association for upwards of three tons of Scottish seed potatoes only of "disease resisting" or "immune" varieties; and leaflets and posters obtained from the Board were distributed among the members and other gardeners likely to be interested.

Samples of the soil of the allotments were sent for analysis to the Agricultural College, at Holmes Chapel, Cheshire; and the information derived from the investigations of the Principal and his assistants proved instructive and valuable to the members when considering the problem of liming, the use of artificials, and so on.

In addition to the work on the experimental plot there has been a certain amount of educational effort through the medium of literature and lectures, and this side of the Association's activities doubtless will be extended with the progress of time.

Sub-Committees.—Besides the Trading Committee various sub-committees were appointed, namely:—

1. *Development and Maintenance.*—This Committee is entrusted with the making and care of the roads and property of the Association, such as fences, tool-house, barrows, etc.

2. *Cultivation.*—The care and control of the common or Association plot is in the hands of this Committee, as also the plots of members serving in the Army or Navy.

3. *Inspection.*—This Committee deals with the observances of the by-laws, which are well drawn up and comprehensive, and seem likely to cover any difficulties that may arise. They comprise the power of dealing with unsatisfactory tenants, a matter which has often caused much difficulty on allotments where each plot is rented separately from the landlord or local authority, or where the Association has been lax in control.

Artistic Allotments.—Everybody has seen allotments with unsightly fences and other ugly erections, and a generally unkempt appearance. The Urmston men do not intend to allow their allotments to degenerate into a public eyesore. Members are asked to reserve the ends of their plots abutting on to the roads for the planting of flowers. This point in itself is significant of the new spirit with which allotment gardening has been taken up, especially in the northern counties.

Results—Financial and Otherwise.—At the end of the first year the Urmston Association issued a balance-sheet showing that from a total income of £112, after meeting all charges and after allowing 20 per cent. for depreciation, assets to the value of about £30 remained the property of the Association. The figures suggest that well-conducted allotment associations, under average conditions, can quickly be placed on a satisfactory basis as to cropping, and also as to finance.

In the opinion of its promoters, however, the Urmston experiment would be misjudged if it were judged only from these two points of view. They attach much importance to the neighbourly feeling which has grown up alongside the friendly emulation of these amateur gardeners. They point out that " the advantages of co-operation are not confined to economy in time and money, for the common interest that binds all members to seek the success of the Association, also provides the means of developing and utilising the individual talents of the members for communal and national purposes." In this connection it should be mentioned that amongst the latest activities of the Association is the formation of a prosperous branch of the National War Savings Committee.

Copies of this article may be obtained free on application, from the Secretary, Agricultural Organisation Society, Queen Anne's Chambers, Tothill Street, Westminster, London, S.W. 1.

Poisoning of Cattle by Ragwort.

THE following Note has been prepared by the Board's Chief Veterinary Officer: It is not generally recognised that the common British Ragwort (*Senecio Jacobæa*, L.) is poisonous to cattle. This probably arises from the fact that poisoning under natural conditions is a slow process, that is to say, an animal does not receive, and could not eat enough of the weed at one meal to cause acute poisoning. On the other hand, the poison is cumulative in its action; with continuous doses the amount of poison which becomes available is sufficient in time to cause very serious symptoms which often end in death.

Much more attention has been given to the subject of poisoning by certain species of ragwort in South Africa, Canada, and New Zealand, and in certain districts where it is commonly met with it was believed to be a disease of cattle until its actual cause was discovered. Thus, we find such names applied to it as Pictou, Winton, and Molteno disease. The following represent broadly the circumstances of the cases which have recently come to the notice of the Board. Pastures containing a considerable proportion of the weed were cropped in the hope that the comparatively early cropping might help to get rid of it. The crop was made into hay, and, owing to the prolonged spell of cold weather and the scarcity of other feeding stuffs, this was fed later and in considerable amount to animals at pasture.

Poisonous Principle.—The actively poisonous agent in the plant seems to be one or more alkaloids which have been extracted in more or less pure form from various species of ragwort.

Symptoms.—As might be expected from what has previously been said, the onset of poisoning is insidious. In the cases which have recently been inquired into at the Board's Laboratory it was not possible to say definitely what quantity of ragwort had been consumed by the animals before symptoms of illness became visible, as the dried forage containing the weed had been simply dumped on the pastures, and the cattle allowed to partake of it at will. The feeding, however, in one instance, was known to have begun on the 21st February, and continued until the 17th April, *i.e.* 55 days. The animals were then changed to other pastures, and feeding on the forage, which by this time was under suspicion, was discontinued. The first visibly affected animal was noticed on 6th April, *i.e.* 44 days after feeding on ragwort commenced. The time which elapsed between the first appearance of definite symptoms and death varied from a few days up to a month. Some of the animals died in a few days after the first appearance of definite symptoms. In others the symptoms continued for a month or more and deaths occurred at the later dates. It would appear also that, although animals which have received a toxic amount of ragwort over a certain period may seem healthy at the time when feeding on the material is discontinued, they may nevertheless develop active symptoms of poisoning, and die at a later period. Thus, in the cases which have been investigated, some of the animals did not show definite symptoms until twelve days or more after the feeding with ragwort had been discontinued.

In the early stages the animals have the appearance of being hide-bound. Later they walk with a staggering gait, some appearing to be partially blind or heedless of where they go. Later they may become very excitable, and will charge at anyone who approaches them. In some there may be diarrhœa, but usually constipation is so marked that it causes violent straining. The pulse is weak and rapid, but the temperature remains normal.

Post-mortem Appearances.—When death takes place in the earlier stages of poisoning the principal lesions found are inflammation of the mucous membrane of the bowel. The omentum is dropsical. Small hæmorrhages are present under the mucous membrane of the bowel and in the serous covering of the heart (pericardium). In acute cases the liver is firmer than normal and yellow in colour, the yellow colour apparently arising from fatty degeneration of the liver cells. In chronic cases the liver is very hard owing to an increase of the fibrous tissue of the organ (cirrhosis of the liver), and in such cases the abdominal cavity contains fluid. This is not unlike what is seen in some animals affected with fluke disease. The lungs are congested.

Prevention.—There is no cure and prevention resolves itself into removing the ragwort from the forage or eradicating it from the pastures.

In the *Journal of the Department of Agriculture and Technical Instruction for Ireland*[*] McGovern makes the following recommendations in relation to the eradication of the weed :—

" Ragwort may be exterminated by preventing the plant from seeding. This may be done in the following ways :—

(*a*) " By grazing infested land with sheep in the winter and early spring ;

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[*] Vol. XVI, 1916, p. 411.

(*b*) " By cutting the plants in the flowering stage either—

(i.) " Twice, the first cut being made early in July, and the second about six weeks later, there being no necessity to gather up the cut portions ; or,

(ii.) " Once only, cutting being done late in July or early in August. The cut portions of the plants must be gathered up at once and be destroyed by burning.

(*c*) " By pulling the plants if circumstances permit, preferably early in July, when there is no need to collect and burn the pulled plants. If pulled later the plants must be collected and burned to prevent seeding.

" It is most important to remember that since ragwort is a biennial plant it is absolutely necessary on pasture land to carry out cutting or pulling during two successive seasons.

" It is clear that in addition to the two-year-old flowering individuals present in a given summer there must also be a crop of one-year-old plants still in the rosette stage which will produce their flowering stalks during the second summer.

" Further, since it is practically certain that the seeds of ragwort, like those of charlock, poppy, and some other plants, may lie buried in the soil (although still retaining their vitality) for some time, it must be remembered that any farming operations which may bring these seeds to the surface will result in their germination, and a crop of ragwort derived from such seed is not an infrequent occurrence on land newly laid down in grass.

" Finally, owing to the ease with which the seed of ragwort is distributed by the wind the re-seeding of land temporarily cleared of it is an easy matter when the plant is allowed to flourish and produce its seeds on neighbouring land. There is, therefore, the strongest reason for scheduling this plant as a noxious weed all over the country, and for throwing the responsibility for its eradication on the shoulders of all those who possess or occupy land."

Recommendation (*a*) does not necessarily mean that sheep are immune to poisoning by ragwort, although this is a somewhat general belief. On the other hand there is reason to think that the flowering season—June, July and early August—is the time when ragwort is most actively poisonous. The question of whether flowering ragwort is poisonous to sheep is now being investigated at the Board's Laboratory.

Having regard to the experience acquired in practice of grazing sheep on ragwort pastures during the winter and early months of the year, it would seem reasonable to assume that

that practice is not attended by bad results. It may be, however, that sheep grazed, even for a comparatively short period, on ragwort receive damage to important organs like the liver.

Economical Feeding of Pigs.

IN view of the serious shortage of concentrated feeding-stuffs it is necessary at once to consider how best to apportion the available supplies among the different classes of farm animals. The production of human food by the feeding of animals must at present be considered a wasteful process, except in so far as it involves the conversion of material not suitable for human sustenance. Considered from this standpoint, how does the pig compare with other animals ?

Hitherto pigs have been fed very largely on materials most of which in one form or another are fit for human consumption. Experience shows that it takes about 7 lb. of concentrated food to produce 1 lb. of pork or bacon, whilst it is estimated that on the average only about 2 lb. of concentrated food (in addition to roots and straw) are consumed in the production of 1 lb. of beef or mutton. Furthermore, 7 lb. of cereals will make about 5 lb. of flour or 7½ lb. of bread ; and 1 lb. of cereals is of greater feeding value than 1 lb. of meat. It is clear, therefore, that the feeding of pigs on foods suitable for human consumption is not at the present time in the national interest. They must be restricted as far as possible to foods which cannot be used for human beings, such as grass, roots, silage, the coarser milling offals, damaged grain, fish meal, dried yeast, dried grains, malt culms, oil-cakes and extracted oil-cake meals, and waste products such as whey and town and household refuse.

Grazing.—Wherever possible, pigs should be turned out to pasture. The growing of special forage crops for folding with pigs or for " soiling " is not to be recommended at present in view of the necessity of using arable land for the cultivation of cereals. Clover, lucerne or ordinary pasture will provide the best grazing crops for pigs under present circumstances. In grazing lucerne care must be taken not to overstock it. The number of animals should be regulated to allow two or three cuttings yearly. Over-pasturing without mowing injures the crowns of the lucerne plants. The cut lucerne may be made into hay and fed to pigs during the winter along with other foods. Pig-grazing might be more generally practised in standard orchards.

Green food alone will not as a rule fatten pigs, but it will keep them in healthy growing condition and save a great deal of meal. With a few weeks of sty-feeding on concentrated food at the end of the grazing period prime bacon can be produced. Barren sows have actually been fattened on good pasture without any supplementary foods, and palatable pork can also be produced under the same conditions. It is necessary that pigs should be accustomed gradually to the out-door life.

Before turning pigs on to pasture they should be ringed. They may be folded or allowed to run at large. Folds should not be too small or the pigs tend to deposit their manure mainly on the boundaries.

Fencing is of course a difficulty at the present time ; it may, however, be worth mentioning that, in the event of pigs " nosing " under a fence, a barbed wire fixed close to the ground will prove a sure deterrent. Two strands of barbed wire fixed 6 in. and 15 in. respectively from the ground will effectually confine all pigs. Hurdles are suitable for folding.

Breeding Stock.—The reduction in the number of pigs which is necessary to meet the present abnormal conditions must not be allowed to endanger the future of the breeds, and an adequate nucleus should be retained to ensure the re-establishment of the pig industry after the war. No hard and fast rules can be laid down for the guidance of pig-keepers in selecting a suitable type for grazing. Pedigree stock of probably all the breeds will soon adapt themselves to an out-door life, but for general purposes a good quality sow of the local breed, crossed with a boar of an early-maturing breed such as the Middle White will usually prove satisfactory.

As a general rule in-pig sows and gilts may be turned out to pasture from April to October, and given only a minimum of concentrated food. If the pasture is a good one no supplementary food may be required. In the winter months they may be allowed to run out in paddocks with access to shelter up to within a few weeks of farrowing. Shelter may consist of cheap erections made of wood faggots and hurdles stuffed with straw. If possible, access should be given to mature woods. The animals will continue to find a considerable proportion of their food on the pasture and in the woods, especially if the latter contain an appreciable number of nut-bearing trees and edible plants. In addition, mangolds or other roots should be supplied and a pound or two per head per day of beans or their equivalent.

Farrowing should be regulated so as to occur not later than July with the second litter coming about January. The first litter could then be disposed of for slaughter in the autumn without necessitating the use of any appreciable quantity of concentrated food. As a rule sows should be brought home to farrow. During the suckling period the food may consist largely of succulent herbage, roots, waste potatoes, silage and chaffed clover or lucerne with the addition of about 3 lb. of concentrated food. The condition of the sow should determine whether more than this amount of concentrated food is given. Roots, potatoes and chaff should be boiled or steamed, and to this should be added some milling offals or finely ground oil-cake at the rate of about 1 lb. of the concentrated food to 10 lb. of roots or similar food.

Feeding of Store Pigs.—Young pigs should still receive a moderate allowance of meal during weaning. When they have reached the age of 10 weeks they should be encouraged to find most of their food out-of-doors. It may be necessary that pig-feeders should cater chiefly for the pork market. Cases are known where porkers sold off pasture have made good prices in the London market without the aid of any concentrated food; as a rule, however, about 1 lb. per head per day on the average should be allowed. For the production of bacon. pigs should, during the last two or three weeks, be prepared for slaughter mainly on concentrated food.

In the case of sty-fed pigs the aim should be to produce pork rather than bacon. In the winter months, if possible, pigs should be allowed to run in the yards with bullocks. In addition to "gleanings" found there they should receive a mixture of boiled roots or waste potatoes with a very little of the coarser offals, say 1 lb. of offals to 10 lb. of roots or similar food.

Consumers generally must be content with a lower standard of "finish" than has been customary hitherto.

Advantages of the Out-door System.—Under this system it is found that:—

(1) A great saving of meal is effected.
(2) Breeding sows are more prolific and much hardier than those kept in sties.
(3) The young are bigger and hardier than sty-bred pigs.
(4) Pasture is improved by pig-grazing.
(5) Valuable food materials such as acorns, which are often wasted, are turned to useful account.

Relative Value of Feeding Stuffs.—As a guide in the selection of supplementary foods for pig-feeding the following figures, mainly based on the practical feeding trials of Hansson, may prove useful. They are given for the general guidance of the pig-feeder in considering how foods previously used and now to be excluded can best be replaced. As already indicated, no food suitable for human beings should now be given to pigs. Most of the figures relate only to dairy cows, but on the whole, they may also be considered fairly reliable for other classes of stock —

	Lb. of Food equal to 10 *lb of Barley.*		*Lb. of Food equal to* 10 *lb. of Barley.*
*Barley	10	*Separated milk	60
Wheat	10	Butter milk	60
Oats	12	Whey	120
*Maize	9½	Mangolds	90
Peas	10	Carrots	80
Beans	10	Swedes	100
Earthnut cake	8	Turnips	125
Linseed cake	9	*Potatoes	40
Coconut cake	9	Clover hay	22
Palmnut cake	10	Lucerne hay	25
Wheat bran	12	Green clover	70
Gluten feed	9½	Green lucerne	75
Dried yeast	8	Pasture grass	63
Dried grains	13	Silage (oat and vetch)	100
Malt culms	13		

* Confirmed in experiments with pigs conducted by the Department of Agriculture and Technical Instruction for Ireland

NOTE —*This article may be obtained in the form of Bulletin No 9 Series C, from the Secretary, Food Production Department, 72, Victoria Street, London S W 1*

THE following Note has been communicated to the Board by Mr A Harbord of Friningham, near Maidstone —

Grazing of Pigs in Kent.

As a result of years of breeding and selection, the writer has obtained a strain of pigs which is noted for its hardihood and for being able to pick up a living where other animals might be expected to starve Though the grazing grounds are in a most exposed position, 650 ft above sea level, the pigs are wintered out of doors with only the roughest kind of shelter shed for protection and further, they are only given very limited amounts of concentrated food *i e* not more than 1 to 1½ lb per head per day, this being mixed with a little hay and pulped roots Nevertheless, practically all these special grazing pigs maintain themselves in a healthy thriving condition, and in the summer and early autumn can be drawn direct from the best pastures for the butcher ; as an example of what they can achieve, the record of one of the breeding sows for the year 1915–1916 is given below.

During the autumn of 1915 the sow lived on rough pasture and underwood where there were a few acorns and beech nuts to pick up, and just for a few weeks before farrowing, when the weather was bad, she received in addition an allowance of ½ lb. of maize and 1 lb. of meal per day. She farrowed on 14th December, and was then fed on middlings till 7th February, when her 10 small pigs were weaned. Afterwards she was put to the boar again, and turned out with the allowance of 1½ lb. of concentrated food per day as before. In April, the meal and maize were discontinued and the sow, together with 17 other pigs was put on to a 5-acre field of good pasture where she remained till she farrowed again in June. The second litter of 11 young and the mother were fed on middlings until the piglets were sold at 7 weeks old, and then the sow was served and returned to the 5-acre pasture, receiving no concentrated food till September and only small amounts after that. She farrowed a third time on 24th November, yielding a fine, level, strong litter of 10 pigs.

In reckoning the cost of keeping pigs on this system of management the writer makes no allowance for labour, estimating that the cost of labour is more than compensated for by the value of the manure left and by the improvement of the pasture. In any case the cost of labour would be very small as one man did all the work, except the carting, for a herd of 200 pigs.

The 5-acre pasture not only supplied grazing for 18 pigs during 7 months but was also run over by sheep on several occasions. Putting the rent and rates of the field at £10, and deducting the amount received for the grazing of the sheep at the rate of 4*s.* per score per week, the cost of grazing the pigs works out at the rate of 4*d.* per head per week. With regard to the concentrated food, £11 a ton was paid for the middlings and £8 for the meal. On this basis, the writer estimates that the total cost of keeping the sow and her three litters from December, 1915, to December, 1916, was £30. Against this he places the following returns :—

	£	s.	d.
1st Litter—			
3 gilts sold July, 1916	25	4	0
4 hogs „ October „	30	2	6
3 gilts valued „ „	30	0	0
2nd Litter—			
11 piglets sold July, 1916	15	10	0
3rd Litter—			
10 piglets valued December, 1916 ..	10	10	0
Total	111	6	6

According to these figures it is evident that the sow in question yielded a very handsome profit, and even admitting that in an average year the sow would only produce 2 litters, the returns would still be highly satisfactory.

Notes on Feeding Stuffs for August: *From the Animal Nutrition Institute, Cambridge University.*

CHANGES in price since last month are most irregular. A few articles have remained at last month's prices, for instance, feeding barley, English-made linseed cake, and Bombay cotton cake. Other cakes, except coconut cake, are slightly cheaper. Millers offals are also appreciably cheaper and there is at present a good supply. Dried grains, malt culms, maize, beans and peas are all dearer.

A quotation for boiled linseed oil was included in Table I. last month. This was an error, boiled oil not being suitable for feeding.

Horses.—The season approaches when it will be necessary to provide an extra ration of concentrated food for the horses in order that they may be fit for the heavy work which harvest operations entail. The cheapest foods on the market which are suitable for horses are bran, pollards and palm kernel cake, which may replace oats in the following proportions :—

Ten lb. oats may be replaced by 14 lb. bran, 10 lb. pollards, or 8 lb. palm kernel cake. Of palm kernel cake for horses we have no personal experience, but reports are to hand of its successful use. A ration of 5 lb. of pollards, or 7 lb. of bran, and 4 lb. of palm kernel cake might be tried as a substitute for 10 lb. of oats. Or a mixture of 5 lb. of oats with half the above quantities. Owners should introduce the palm kernel cake gradually.

Milking Cows.—Now is the time when cowkeepers should watch their grass. As soon as signs appear of the grass failing, the cows should be given extra food in order to keep up the milk yield, for cows in full milk seldom recover from a check caused by defective feeding in August and September. Green crops should be used where they are available, and a concentrated ration may also be necessary. Bran or pollards, ground nut cake where it can be bought, palm kernel cake, and linseed cake are the cheapest foods suitable for this purpose at present prices. Needless to say they should be used in the smallest quantity which will suffice for the purpose in view.

Cattle for Beef Production.—Since older cattle are known to fatten better than young stock on roots and straw, and since it is not likely that cake will be available for beef production in the coming winter, graziers should push on their younger stores for slaughter before the grass fails, leaving the older cattle for stall feeding.

A moderate ration, say 3–4 lb of cake per day, will produce more beef if fed now to young cattle for slaughter in the autumn

TABLE I.

Feeding Stuff	Digestible Food Units	Approximate Prices per ton at the end of June					
		London	Liverpool	Hull	Bristol	Glasgow	Leith
		£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
Soya Bean Cake	122 3	—	—	—			—
Decorticated Cotton Cake	126 3	21 0 0	-	—	—		—
London made Cotton Cake	71 9	16 0 0	–	–	-	—	—
Decorticated Cotton Meal	126 3	–	—	—	—	-	—
Decorticated Cotton Cake American	126 3	—	21 15 0	—	—	—	—
Indian Linseed Cake	123 1	21 0 0	21 5 0	—	—	21 10 0	21 10 0
Russian Linseed Cake	123 5	—	—	—	—	—	—
English Linseed Cake	120 1	21 5 [illegible]	21 10 0	20 10 0	—	22 0 0	21 15 0
Bombay Cotton Cake	65 3	—	16 10 0	—	—	—	—
Egyptian Cotton Cake	71 [illegible]	15 12 6	17 5 0	15 10 0	-	16 10 0	16 5 0
Coconut Cake	102 [illegible]	18 5 0	-	—	—	—	—
Palm Kernel Cake	96 1	—	16 5 [illegible]	14 17 [illegible]	-	17 10 0	17 10 0
Palm Kernel Meal (extracted)	92 5	—	—	-	—	—	—
Ground nut Cake	145 2	Nominal	—	17 1[illegible] 6	—	—	—
English Beans	99 5	21 9 5	22 17 4	22 1[illegible] 7	-	—	—
Bean Meal	99 5	—	—	—		[illegible]5 0 0	—
Chinese Beans	101 [illegible]	Nominal	-	—	—	—	—
English Maple Peas	97	2[illegible] 4 5	—	31 2 2			—
English Dun Peas	97	21 11 1	—	24 6 10	—		—
Calcutta White Peas	97 5	Nominal	-	—		—	—
American Maize	93 8	16 6 8	–	–	—	-	—
Argentine Maize	94 [illegible]	17 10 0		—	21 0 0		—
Maize Meal	86 5	20 0 0	-				—
Maize Gluten Feed	121 6	19 0 0	19 1[illegible] [illegible]	—	19 0 0	-	—
Maize Germ Meal	99 2	19 10 0	—	—		—	—
English Feeding Barley	83 0	18 4 0	—	16 16 0	-	—	—
English Oats	75 4	19 15 0	—	19 15 0	*23 6 8	–	—
Argentine Oats	75 4	[illegible]3 11 6		—	–		—
Malt Culms	69 9	13 12 6	–	14 0 0	—	15 10 0	16 0 0
Brewers' Grains (dried)	84 5	(Ale) 18 0 0		15 15 [illegible]	—	—	—
Brewers' Grains (wet)	21 1	(Ale) 2 12 9	—	2 0 0	—	—	—
Distillers' Grains (English)	101 2	18 5 0	-	—	–	} —	17 0 0
Distillers' Grains (French)	101 2	18 5 0	-	—	—		
Distillery Mixed Grains (wet)	20 0	—	—	—	–	–	—
Egyptian Rice Meal	78 7	Nominal	—	—	—	–	—
Burmese Rice Meal	78 7	Nominal	—	—	—	–	—
Rice Bran	78 7	—	—		—	—	—
Wheat Middlings (coarse)	94 8	15 0 0	—	14 10 0	—	16 10 0	15 5 0
Wheat Sharps	90 5	15 5 0	15 0 0	14 10 0	14 10 0	15 10 0	14 5 0
Wheat Pollards	96 7	—	14 5 0	—	—	—	—
Wheat Bran	77 5	13 0 0	—	13 5 0	12 10 0	15 0 0	14 0 0
Wheat Bran (broad)	79 9	14 0 0	14 5 0	15 5 0	13 10 0	15 10 0	14 15 0
Feeding Treacle	60 0	Nominal	22 10 0	—	—	—	27 10 0
Linseed	153 5	30 0 0	—	30 0 0	35 0 0	—	*32 10 0
Linseed Oil	250 0	58 0 0	†60 0 0	54 15 0		—	—
Egyptian Cotton Seed	108 6	19 0 0	–	19 0 0		—	—
Bombay Cotton Seed	99 6	—	—	—	—	—	—
Cotton Seed Oil	250 0	-	73 0 0	—	—	—	—
Fish Meal	145 0	—	—	—	-	17 0 0	16 0 0
Locust Bean Meal *	80 0	—	—	—	—	—	—

* Crushed † In barrels.

than if kept for stall feeding in the winter. The cheapest cakes at the present time are ground nut (not always available) palm kernel, decorticated cotton, and linseed.

Sheep.—Ewes should not be put with the ram until about Michaelmas, so that the lambing season may be deferred until

TABLE II.

LONDON. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet)	2	5½	Linseed	3	11
Maize gluten feed	3	1¾	Malt culms	3	11
Wheat middlings	3	2	Maize germ meal	3	11¾
Decorticated cotton cake	3	3¾	Brewers' grains (dried)	4	3¼
Wheat bran	3	4¼	English beans	4	3¾
Wheat sharps	3	4½	Egyptian cotton cake	4	4¼
Indian linseed cake	3	5	English feeding barley	4	4½
American maize	3	5¾	English dun peas	4	5¼
Wheat bran (broad)	3	6	London-made cotton cake	4	5½
Cotton seed	3	6	English maple peas	4	6¾
Coconut cake	3	6½	Maize meal	4	7½
English linseed cake	3	6½	Linseed oil	4	7¾
Distillers' grains (English)	3	7¼	English oats	5	0½
Distillers' grains (French)	3	7¼	Argentine oats	6	2¾
Argentine maize	3	8½			

TABLE III.

LIVERPOOL. PRICES PER FOOD UNIT

	s.	d.		s.	d.
Wheat pollards	2	11½	Wheat bran (broad)	3	7
Maize gluten feed	3	2¾	English beans	4	7
Wheat sharps	3	3¾	Linseed oil	4	
Palm nut cake	3	4½	Egyptian cotton cake	4	9
Indian linseed cake	3	5½	Bombay cotton cake	5	0½
American linseed cake	3	5½	Cotton seed oil	5	10
English linseed cake	3	7	Feeding treacle	7	6

TABLE IV.

HULL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet)	1	11	Linseed	3	11
Ground nut cake	2	5	Malt culms	4	0¼
Wheat middlings	3	0¾	English feeding barley	4	0½
Palm nut cake	3	1	Egyptian cotton cake	4	4
Wheat sharps	3	2½	Linseed oil	4	4½
English linseed cake	3	5	English beans	4	6½
Wheat bran	3	5¼	English dun peas	5	0¼
Cotton seed	3	6	English oats	5	0½
Brewers' grains (dried)	3	8¾	English maple peas	6	5
Wheat bran (broad)	3	10			

TABLE V.

BRISTOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Maize gluten feed	3	1¾	Argentine maize	4	5½
Wheat sharps	3	2½	Linseed	4	6¾
Wheat bran	3	2¾	English oats	6	2¼
Wheat bran (broad)	3	4½			

TABLE VI.

AVERAGE PRICES PER FOOD UNIT.

LONDON, LIVERPOOL, HULL AND BRISTOL.

	s.	d.		s.	d.
Brewers' grains (wet)	2	2¼	Malt culms	3	11½
Ground nut cake	2	5	Maize germ meal	3	11¾
Wheat pollards	2	11½	Brewers' grains (dried)	4	0
Wheat middlings	3	1½	Argentine maize	4	1
Maize gluten feed	3	2	Linseed	4	1
Palm nut cake	3	2¾	English feeding barley	4	2¼
Wheat sharps	3	3¼	London-made cotton cake	4	5
Decorticated cotton cake	3	3¾	English beans	4	5¾
Wheat bran	3	4	Egyptian cotton cake	4	6
Indian linseed cake	3	5¼	Linseed oil	4	7¼
American cotton cake	3	5½	Maize meal	4	7½
American maize	3	5¾	English dun peas	4	8¾
English linseed cake	3	6	Bombay cotton cake	5	0½
Cotton seed	3	6	English maple peas	5	6
Coconut cake	3	6½	English oats	5	7½
Wheat bran (broad)	3	6¾	Cotton seed oil	5	10
Distillers' grains (English)	3	7¼	Argentine oats	6	2¾
Distillers' grains (French)	3	7¼	Feeding treacle	7	6

TABLE VII.

GLASGOW. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	4¼	Wheat bran	3	10½
Wheat sharps	3	5¼	Wheat bran (broad)	3	10½
Wheat middlings	3	5¾	Malt culms	4	5¼
Indian linseed cake	3	6	Egyptian cotton cake	4	7¼
Palm kernel cake	3	7¾	Bean meal	5	0¼
English linseed cake	3	8			

TABLE VIII.

LEITH. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	2½	Wheat bran	3	7½
Wheat sharps	3	2	Palm kernel cake	3	7¾
Wheat middlings	3	2¾	Wheat bran (broad)	3	8¼
Distillery mixed grains (dried)	3	4½	Linseed (crushed)	4	2¾
Indian linseed cake	3	6	Egyptian cotton cake	4	6¼
English linseed cake	3	7½	Malt culms	4	7
			Feeding treacle	9	0

TABLE IX.

AVERAGE PRICES PER FOOD UNIT.

GLASGOW AND LEITH.

	s.	d.		s.	d.
Fish meal	2	3½	Palm kernel cake ..	3	7¾
Wheat sharps	3	3½	Wheat bran	3	9
Wheat middlings ..	3	4¼	Linseed (crushed) ..	4	2¾
Distillery mixed grains (dried)	3	4½	Malt culms	4	6
Indian linseed cake ..	3	6	Egyptian cotton cake ..	4	6¾
Wheat bran (broad) ..	3	6½	Bean meal	5	0¼
English linseed cake ..	3	7¾	Feeding treacle	9	0

TABLE X.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Name of Feeding Stuff.	Nutritive Ratio.	Per cent. digestible.			Starch equiv. per 100 lb.	Linseed Cake equiv. per 100 lb.
		Protein.	Fat.	Carbo-hydrates and Fibre.		
Foods Rich in both Protein and Oil or Fat.						
Ground nut cake	1 : 0·8	45·2	6·3	21·1	77·5	102
Soya bean cake	1 : 1·1	34·0	6·5	21·0	66·7	88
Decort. cotton cake ..	1 : 1·2	34·0	8·5	20·0	71·0	93
Linseed cake, Indian ..	1 : 1·9	27·8	9·3	30·1	77·1	101
Linseed cake, English ..	1 : 2·0	26·7	9·3	30·1	76·0	100
Cotton cake, Egyptian ..	1 : 2·1	15·5	5·3	20·0	40·0	53
Cotton cake, Bombay ..	1 : 2·5	13·1	4·4	21·5	37·6	49
Distillers' grains (English) Distillers' grains (French)	1 : 2·9	18·7	10·2	29·0	57·3	75
Maize gluten feed	1 : 3·0	20·4	8·8	48·4	87·4	115
Brewers' grains, dried .	1 : 3·5	14·1	6·6	32·7	50·3	66
Coconut cake	1 : 3·8	16·3	8·2	41·4	76·5	101
Palm kernel cake	1 : 4·5	14·1	6·1	48·9	76·7	101
Linseed	1 : 5·9	18·1	34·7	20·1	119·2	157
Bombay cotton seed ..	1 : 6·6	11·0	16·8	30·1	77·5	102
Fairly Rich in Protein, Rich in Oil						
Maize germ meal	1 : 8·5	9·0	6·2	61·2	81·0	107
Rice meal	1 : 9·4	6·8	10·2	38·2	68·4	90
Rich in Protein, Poor in Oil.						
Fish meal	1 : 0·1	54·0	4·0	—	60·0	78
Peas, Calcutta white ..	1 : 2·1	23·3	1·1	45·9	66·9	88
Beans, English	1 : 2·6	19·3	1·2	48·2	67·0	88
Beans, Chinese	1 : 2·6	19·6	1·7	47·9	67·0	88
Peas, English maple ..	1 : 3·1	17·0	1·0	50·0	70·0	92
Palm-nut meal (extracted)	1 : 3·4	15·6	1·9	48·7	66·1	87
Brewers' grains, wet ..	1 : 3·5	3·5	1·5	8·6	12·7	17
Malt culms	1 : 3·6	11·4	1·1	38·6	38·7	51
Cereals, Rich in Starch, not Rich in Protein or Oil.						
Barley, feeding	1 : 8·0	8·0	2·1	57·8	67·9	89
Oats, English	1 : 8·0	7·2	4·0	47·4	59·7	79
Oats, Argentine	1 : 8·0	7·2	4·0	47·4	59·7	79
Maize, American	1 : 11·5	6·7	4·5	65·8	81·0	107
Maize, Argentine	1 : 11·3	6·8	4·5	65·8	83·5	110
Maize meal	1 : 13·0	5·5	3·5	63·9	77·8	102
Wheat middlings, fine .	1 : 4·8	13·2	3·0	53·8	72·0	95
Wheat middlings, coarse or sharps	1 : 5·1	13·8	4·3	50·5	64·0	84
Wheat pollards .. .	1 : 4·5	11·6	4·0	51·6	60·0	79
Wheat bran	1 : 4·7	11·3	3·0	45·0	49·7	65
Wheat bran, broad ..	1 : 4·7	11·3	3·0	45·4	48·1	63
Locust bean meal	1 : 22·1	4·0	0·7	69·2	71·4	94

there is a prospect of keeping the ewes and lambs without the use of much concentrated food.

Lambs and tegs in forward condition will go back on roots in the winter unless they get a fair ration of cake, which it may be impossible to provide. Farmers who consider the future will look over their lambs and tegs, and pick out all those which promise to be ready for the butcher before Christmas. These should get a little cake now so that they may come to the butcher before the shortage of cake gets worse. Lambs and tegs which do not promise to be ready for slaughter by Christmas should be run as stores during the winter and fatted next summer, since they are not likely to fatten in the winter without more cake than will probably be available

Shearings and cull ewes should be kept as stores until they go on to roots for the winter. They will put on flesh in the winter on roots if helped with whatever dry fodder may be available.

Pigs.—There is at present a fair supply of wheat offals, and there will no doubt be a certain amount of chats from the second early potatoes. It will hardly be possible to cook these on account of the coal shortage, but if sliced or pulped and mixed with an equal weight of a mixture of 5 parts of sharps or middlings and 1 part of palm kernel meal or cake, they should form a useful change for pigs which have been on grass or green stuff.

Notes on Poultry Feeding:

From the Harper Adams Agricultural College, Newport, Salop.

REDUCTION in the head of poultry has no doubt taken place during the past two or three months, and more may still be done in reducing unsatisfactory stock by disposing of two-year-old birds as soon as their laying season is over and moulting commences. A reduction in the younger stock could advantageously be made by a careful examination of all the birds in the flock. It is well known that flocks contain a number of birds which, though looking well, are not laying and not paying. A bird's capabilities as a layer can be determined at once by those who possess a knowledge of the particular features to look for and who handle the bird carefully, and if owners would use this knowledge a large number of useless and wasteful birds would be eliminated from the flock.

The problem of foodstuffs has not been solved, but it is the duty of all to preserve all such food as can be used for human consumption for that purpose. There are still obtainable supplies of damaged grain, screenings and tailings which under the Food Controller's Order of 16th April, 1917, should be obtainable at prices not exceeding those laid down for wheat, barley, and oats, of the 1916 crop. Hard grain is not an absolute necessity though a decidedly advantageous addition to the hen's ration. Cockled wheat is frequently offered and should be examined carefully before being fed to birds, as the true corn cockle seed is poisonous, whereas much that is sold as cockled wheat contains other seeds which may be safely fed to poultry. Oats and cracked maize fed sparingly make a useful "scratch mixture."

While very little opportunity occurs for variation and discretion in the hard food used, there are still many soft foodstuffs available for poultry. The principal meal available, and one which is being used as a basis in several compounded meals, is palm nut meal. In a series of trials carried out with palm nut meal, ground nut meal, etc., in various forms (sweetened and unsweetened, extracted), mixed and fed alone, it was found that all proved useful foodstuffs for poultry when fed with discretion. The common mistake is to make sudden changes and to feed too large quantities. The mixed meals should not at first contain more than 5 per cent. of such a food as palm nut meal, and the quantity can be gradually increased, say 5 per cent. every third day to a maximum of 25 per cent. In the trials referred to the sweetened foods did not prove as suitable as the unsweetened, a noticeable effect being produced by the former upon the quality of the yolk and flavour of the egg, and further, the birds did not take to the food so readily. The ration may commence with sharps 60 per cent., bran 30 per cent., fish meal 5 per cent., meal (under trial) 5 per cent.

At the present time of year, green food should form a valuable addition to the ration, and where birds have a free run they will make as full use of the green clover as they do of the dried form so frequently included in mixtures. Where lucerne, sainfoin, and similar plants are available, they can be profitably used.

Prices during the last month have shown an upward trend, and the cost will now work out to at least 3¾*d.* per head per week upon the following ration, with foods at the prices now ruling :—

Sharps	80 parts.
Bran	10 ,,
Palm kernel meal	25 ,,
Fish meal	15 ,,
Feed wheat	35 ,,

Feed per day, 4⅛ oz. per head.

The present price of eggs is, however, such as to justify such a ration, since a return of two eggs per week would cover the cost of food, and any addition to this number would be reckoned as profit.

Foods on which Animals May and May Not be Fed.

THE Board have received inquiries as to the feeding stuffs on which farm animals may or may not be fed, and in particular as to "prohibited" foods. They therefore think it desirable to issue the following statement summarising the Orders now in force :—

Wheat, Rye and Rice.—Wheat, rye and rice, or flour prepared therefrom, must not be fed to any class of stock. This does not apply to tailings, screenings, or other material so damaged as to be unsaleable for milling. (*Statutory Rules and Orders*, 1917, No. 376.)*

Oats, Maize, Beans and Peas.—Oats, maize, beans and peas may be fed to horses without restriction only in the following cases :—

(1) Horses in the possession of the Army Council or the Admiralty, or exclusively used for the purposes of the Army Council or Admiralty.

(2) Horses maintained and used exclusively for agricultural purposes.

(3) Stallions used exclusively for stud purposes.

(4) Thoroughbred brood mares.

(5) All other brood mares in foal or with foal at foot.

For all other horses the following restrictions must be observed :—

(*a*) Horses, other than thoroughbreds, solely or mainly used for trade or business purposes must not receive more than certain specified rations of oats, maize, beans or peas.

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* See *Journal*, May, 1917, p. 236.

(*b*) Thoroughbred horses not specifically excluded as above from restriction, must not receive more than certain maximum rations.

(*c*) No oats, maize, beans or peas must be given to any horse not included in the classes specified above.

The person or persons in possession of any horse falling within (*a*) or (*b*) must keep records of the oats, maize, beans and peas used for feeding such horse, and such records must at all reasonable times be open to the inspection of an officer of police or any other person authorised by the Food Controller. For horses to which the restrictions apply no other cereal foodstuff may be used except bran and dried brewers' grains. These may be used without restriction for the feeding of any horse. (*Statutory Rules and Orders*, 1917, No. 439.)*

For all other classes of stock the use of oats, maize, beans and peas is still permitted without restriction, but it is urgently necessary in the national interest that the use for stock-feeding of these foods should be reduced to the very narrowest limits possible, except in the case of material that is obviously unfit for human consumption.

Malt.—Malt must not be used for any purpose (apart from brewing for sale under certain conditions) except under the authority of the Food Controller. (*Statutory Rules and Orders*, 1917, No. 345.)

Chaffed Hay.—No chaffed or chopped hay must be manufactured, purchased, sold or delivered in Great Britain unless it contains not less than 20 per cent. of chopped straw. (*Army Council Order*, 9th May, 1917.)†

It may be stated briefly that the following feeding stuffs are :—

Allowed §	*Forbidden.*	*Restricted.*‖
Wheat Offals.	Wheat.	Oats.
Gluten Feed.	Barley (imported or kiln-dried home-grown).‡	Maize.
Maize Germ Meal.	Rye.	Beans.
Dried Grains.	Rice.	Peas.
Malt Culms.	Malt.	Other cereal foodstuffs except bran and dried grains.
Oil Cake and Meals.		

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* See *Journal*, June, 1917, p. 362. † See *id.*, p. 364. ‡ See *id.*, May, 1917, p. 235. § The list of foodstuffs under this heading is not intended to be exhaustive. ‖ May not be fed to certain classes of horses—see above.

Committee on the Production and Distribution of Milk: Interim Report.*

IN April of the present year, the President of the Board of Agriculture, by request of the Cabinet and with the concurrence of the Food Controller, appointed a Committee to report on "the production and distribution of milk, including the consideration of the steps which should be taken (1) to stimulate production, (2) to conserve milk supplies during any period of excess, (3) to provide for the special needs of children in urban centres, (4) to effect economies in the cost of production and distribution, (5) to organise supplies by administrative action so as to reach all sections of the community, and (6) other kindred subjects." The Committee are constituted as follows :—

Major the Hon. Waldorf Astor, M.P.	*Chairman.*
Mr. W. Anker Simmons	Ministry of Food.
Professor T. B. Wood	Board of Agriculture and Fisheries.
Sir Robert P. Wright	Board of Agriculture for Scotland.
Mr. J. R. Campbell, B.Sc.	Department of Agriculture and Technical Instruction for Ireland.
Dr. A. W. J. MacFadden, C.B. ..	Local Government Board, England.
Major Gerald R. Leighton, M.D. ..	Local Government Board, Scotland.
Mr. Dermod O'Brien, D.L.	Local Government Board, Ireland.
Mr. J. Mackintosh, *Secretary*	Food Production Department.

The Committee did not hold its first meeting till May 21st, having been instructed not to begin the consideration of the problems referred to until the Grosvenor House Committee had completed its work. This latter Committee had been appointed at the end of April by the Food Controller, under the chairmanship of Lord Somerleyton, to report "upon the effect of the existing Milk Order on the production and distribution of milk and the difficulties which had arisen in connection with the fixing of maximum prices, and to make recommendations to Lord Devonport as to the lines upon which any future Orders made by him should be framed." Their Report was published on 9th May.† It contained recommendations with regard to prices, and, with reference more particularly to production, some suggestions which are referred to and endorsed in the recommendations of the present Interim Report.

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* [Cd. 8608]. Price 2*d.* Net.

† Report of the Advisory Committee . . . set up at a Conference held by the Food Controller on 19th April, 1917 . . .

Milk, when compared with other animal foods, has been and is still one of the cheapest foods obtainable. Before the War, one shillingsworth of milk supplied more nutriment than could be purchased for the same money in the common cuts of beef, mutton, or pork, and twice as much as could be purchased in eggs or fish. Since the War, beef has risen in price 112 per cent., eggs 78 per cent., fish 138 per cent., and milk only 62 per cent. The Committee are not only impressed with the necessity of maintaining the existing supply of milk during the War, but are also of opinion that the total consumption might be increased considerably in the interests of the children of the country. The immediate problem being, however, to safeguard against a possible shortage of milk next winter, the Committee have accordingly, before investigating in any detail the larger questions of future policy, begun by devoting their immediate attention to considering what steps could be taken to prevent or diminish the above contingency. They are of opinion that there are three main directions in which action can be taken to meet this urgent problem :—

(*a*) The uncertainty and sense of insecurity which exists among dairy farmers, particularly in respect of prices, labour and feeding stuffs, should, as far as possible, be immediately reduced. To this end the Committee urge in the first place that the Food Controller announce as early as possible the milk price he proposes to fix for the remaining summer months and for next winter. Secondly, while recognising that some most valuable labour has been provided by newly-trained milkers, the Committee are of opinion that such labour cannot replace experienced cowmen and feeders and that cowkeepers should, therefore, be allowed to retain their skilled men. Thirdly, they recommend that in the distribution of cakes, millers' offals, etc., a preference should be given to dairy herds, and they hope that steps will be taken to see that dairy farmers maintain an adequate acreage of roots and forage crops.

(*b*) The surplus summer milk should be used to the best advantage, that is to say, the largest possible proportion should be converted into dried or condensed milk. The Committee believe that by working the existing plants and factories for the preparation of dried milk at their fullest capacity the total output might be increased by 50 per cent. Further, they recommend that the Food

Controller should consider the advisability of purchasing the whole supply of dried and condensed milk. The Committee also recommend (1) that the surplus milk which cannot be manufactured into dried or condensed milk should be used as far as possible for cheese rather than butter making, except where the skim or separated milk is consumed as human food; (2) that the use of milk in any form for the manufacture of milk chocolate, and that the sale of preserved cream should be prohibited; with regard to the use of Devonshire and Cornish cream, however, the Committee do not feel justified in recommending an immediate and total restriction, in view of the local difficulties of utilising this milk for other purposes and of the small quantity actually used.

(*c*) The loss of milk during the warm months of the year by waste or souring before it reaches the consumer should be reduced. The Committee are investigating the extent of this loss and the steps which might be taken to diminish or eliminate it.

Land Settlement for Discharged Soldiers in Ontario.*

THE Province of Ontario has now completed the arrangements for a land colonisation scheme by which discharged soldiers who have served with the British Forces are offered the opportunity of securing homes in New Ontario.

All men who wish to go upon the land will first be sent to an agricultural training depot where they will be provided with good board and living accommodation during their period of instruction, and where they will be paid a reasonable wage for work done. As soon as a sufficient number of trained men have accumulated, a Farm Colony will be established along the line of the railway. The Colony will be in charge of a competent superintendent, under whom the men will proceed to do whatever clearing may be necessary, erect the necessary buildings, and do such other work as may be essential to the establishment of a central community. The men will be housed and cared for in the central community, and paid a reasonable wage, and their labours will be directed to clearing and preparing for cultivation the land of the colony. Farms containing not more than 80 acres will be laid out in such manner as to bring the different farmhouses as close together as possible, and an area of 10 acres will be cleared on the front of each farm.

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* *The Agricultural Gazette of Canada*, Vol. IV, p. 306, 1917.

As soon as a soldier desires to go upon a farm and work for himself, an 80-acre lot with a 10-acre clearing will be allotted to him. He will be supplied with the necessary machinery and tools, and such cattle, pigs, poultry, etc., as the competent authority may determine, up to the value of $500 (£104). The 80 acres, with 10 acres of clearing, will be given to the settler free of charge. For the advance of $500, made to cover the cost of stock, implements, equipment, and any assistance in building that may be given, a lien will be taken against the settler's holding and chattels. The lien will be repayable in 20 years, at 6 per cent., but no payment on account of either principal or interest shall be required until after the expiration of three years. At the expiration of five years from the time the settler takes up his land, and upon the observance of certain conditions during that time, he will be entitled to receive a patent from the Crown.

The community system will apply with regard to the provision of horses and other stock and implements, a supply of these being kept at headquarters for the use of the settlers on easy terms. Buying and selling will be done upon a co-operative basis, and every effort will be made to establish the men quickly upon a prosperous and independent footing.

The social side of life at the Colony will not be neglected. A proper public building, where both religious and secular gatherings may be held, will be provided, also a school-house and educational facilities. Arrangements will be made at an early date for married men to have their families with them, and, as far as possible, discharged soldiers with practical experience will be employed to direct the affairs of the Colony.

Soldiers who may desire to go into fruit farming and chicken raising, or other specialised branches, will be given free instruction at the Public Institution of the Province.

The Progress of Co-operative Societies in India.

DURING the twelve years which have elapsed since the Government of India passed the Co-operative Societies Act, the progress of the movement has been very remarkable, and has suffered little interruption either from bad harvests or from the outbreak of war. According to statements which have recently been issued for the year 1915-16, the number of Co-operative Societies of all kinds at the end of that year was 19,675, with a membership of 918,436, and a working capital of no less than £6,884,000, of which only £107,000 had been provided by Government. The corresponding figures for the previous year were 17,327 societies, with a membership of 824,469 and working capital of £5,977,000, so that marked progress continued to be made during the year. Of all the provinces, the Punjab takes the lead with 3,393 societies, 148,043 members and a working capital of £1,371,000. The statistics include

605 central institutions, such as provincial banks and unions, and 1,019 non-agricultural societies, but attention may be confined to the agricultural societies which so far limit their operations almost entirely to the provision of small loans to peasant farmers. These agricultural societies now number 18,051, with 717,163 members, an average of 40 members per society.

Detailed statistics have been furnished for 17,729 agricultural societies, of which 17,610 are Co-operative Credit Societies, practically all formed on the basis of unlimited liability. During the year these societies made loans to individuals amounting to £1,520,000, and at the end of the year the amount of loans due to them by individual members was £3,034,000. At the end of the year their working capital amounted to £3,440,000, made up as follows :—

	£
Paid-up share capital	510,000
Deposits made by members	227,000
Deposits made by non-members	235,000
Loans fron other societies and banks	1,980,000
Loans from Government	86,000
Reserve fund	402,000

The profit on the year's working was £132,000, which is equivalent to nearly 4 per cent. on the working capital, and the cost of management was only £30,000, an average of less than £2 per society.

These agricultural credit societies are usually able to borrow money at from 6 to 9 per cent., and the rate they charge on loans made to members generally varies from about 9 to 12½ per cent., which is a low rate in a country where it is difficult for the individual peasant, even when he is fairly solvent, to borrow money from the village banker at less than 20 per cent. By the establishment of these Co-operative Credit Societies, which are managed by the peasants themselves, but carefully controlled by a staff of Government officials, more than 700,000 peasants, who are most of them illiterate, are now enabled to obtain the capital necessary for their agricultural needs much more readily, and at a much lower rate of interest, than they could before.

The reserve funds, which already amount to nearly 12 per cent. of the working capital, are being added to year by year, and in the Punjab several societies are now practically independent of outside assistance, their share-capital, deposits and reserves being sufficient for the members' needs. They are thus enabled to reduce the rate of interest charged on loans to members from 12½ to 8 or 9 per cent.

A beginning has also been made, especially in Burmah, with the formation of Co-operative Societies for the insurance of plough-cattle. There are now in India 321 such societies, insuring 8,821 animals. During the last year, the number of animals on which claims had to be paid was 187, or little more than 2 per cent. of the animals insured, a rate of mortality which compares favourably with the 2½ per cent. per annum which is the rate of mortality in England and Wales for Co-operative Societies insuring dairy cows. Although these societies have only recently been started, they had at the end of the year accumulated reserve funds amounting to £1,063. If further experience shows that the rate of mortality continues low, there is little doubt that this branch of the movement also will rapidly spread, and that the Indian peasants will find that they can insure their cattle at very little cost by taking advantage of the co-operative principle.

OFFICIAL NOTICES AND CIRCULARS.

THE following Circular Letter, dated 14th June, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees :—

Breaking Up of Pastures for the Harvest of 1918.

SIR,—The Board have given careful consideration to the representations which have been received from Agricultural Executive Committees and from other bodies of agriculturists with reference to the programme for the harvest of 1918 as outlined in the Board's Circular Letter of the 15th ultimo, F. P. 53.*

The task suggested in that letter was expressed in terms of the acreage of grassland in England and Wales that might have to be broken up and brought under cereals in order to render the country self-supporting in case of extremity, but it was also contemplated that more corn crops should be grown on existing arable land. This has not been fully understood in some quarters, and it is considered desirable, therefore, to restate the national task in terms of the total acreage that should be devoted in each county to corn crops, including beans and peas.

Suggestions have been made that the Board should indicate the contribution desired from each county in terms of quantity of produce rather than in acreage, and several Committees have expressed the view that the quantity of food required could be obtained by increasing the production from the existing arable land in preference to breaking up large areas of permanent grass.

The Board entirely agree with the view that the utmost possible use should be made of existing arable land, and that every endeavour should be made to obtain the largest possible yield, but they are satisfied that, under war conditions, and in view of the shortage of labour and fertilisers, it would be most unwise to assume that it will be possible, taking the county as a whole, to obtain more than the average yields per acre of the ten years preceding the War.

The programme for the harvest of 1918 has, therefore, been revised in the light of later developments and with the object of indicating to each county the total acreage of corn crops which it should aim at securing. The opportunity has also been taken to make certain adjustments which it is hoped will ease the task which the Committees are asked to undertake, and which will meet some of the objections brought forward by those who have expressed anxiety with regard to the milk supply.

It is possible to do this without impairing national security, as, owing to the fact that arrangements have now been made to grow much larger quantities of corn in Ireland and Scotland than was originally anticipated, the contribution of England and Wales to the food supply of the nation can be proportionately reduced.

[Here follows a revised estimate for the county addressed of the acreage of permanent grass to be broken up before next spring.]

These figures are submitted, in the first instance, for the consideration of your Committee, who should report to the Department at the earliest possible date whether there is any insuperable difficulty in securing the quota suggested or whether they desire to propose any modifications.

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* See *Journal*, June, 1917, p. 351.

The success of the work of your Committee will depend largely on the judgment shown in selecting grassland for ploughing. It is clearly undesirable to break up stiff, wet land which would demand thorough draining and liming to enable it to produce grain; it is equally undesirable to break up poor, sandy soils for which manure is not available, and which could not be expected to yield even a moderate crop unless the season of 1918 were quite exceptionally favourable. Grassland of medium texture and fair fertility should be selected, so far as possible.

If, in the opinion of your Executive, it is impracticable to break up as much permanent grassland as the Department suggest, it is open to them to substitute an additional area of rotation grass. It must be remembered, however, that there is a point beyond which the breaking up of rotation grass cannot safely be carried, and, in view of the uncertainty of the duration of the War and the necessity for economising the fertility of our soils, it is preferable to use the fertility stored up in pastures rather than to exhaust the condition of arable land by continuous corn-growing.

In conclusion, I desire again to impress upon Executive Committees the importance of securing as much as possible of their county quotas by an agreement with the parties concerned and of only resorting to compulsion if all other means fail. In this connection it is hoped that the general principles laid down in my Circular Letter of 2nd June* will be observed by all Committees and, in particular, that the co-operation of owners or agents of large estates, should always be invited, in the first instance, in selecting such areas of grassland as may require to be broken up.

I am, etc.,
ARTHUR LEE,
Director-General.

Letter from the President of the Board of Agriculture to The Rt. Hon. Henry Hobhouse.

THE following Letter, dated 5th June, 1917, was written by the President of the Board of Agriculture and Fisheries to the Right Hon. Henry Hobhouse, to be read to the War Committee of Somersetshire:—

DEAR MR. HOBHOUSE,—You asked me to send you a letter on the agricultural programme for the increase of food production. I therefore write the following explanation of the figures originally submitted.

In 1915 the acreage devoted to wheat, barley and oats, respectively, in the United Kingdom was—

Wheat	2,051,729	acres.
Barley	1,651,874	,,
Oats	4,146,843	,,
	7,850,446	,,

On this acreage were produced—

Wheat	7,471,884	qr.
Barley	6,612,550	,,
Oats	21,333,782	,,
	35,418,216	,,

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* See *Journal*, June, 1917, p. 349.

The agricultural programme for the United Kingdom in 1918 suggested the addition of 4,250,000 acres under cereals and potatoes.

It was further suggested that this acreage should be thus distributed between the three cereals—

Wheat	2,000,000
Barley	1,000,000
Oats	1,500,000

From this acreage it might be expected that an additional 19½ million qr. of grain would be produced, making the total production of grain approximately 55 million qr. This quantity, deducting 20 per cent. of the wheat and barley, and 40 per cent. of the oats, for seed, livestock, etc., would, if milled into flour, supply the 3,300,000,000 4 lb. loaves which the people of this country annually consume.

This result could also be partly obtained, if the necessary fertilisers and labour were available on the existing arable land, by increasing the yield per acre and by reducing the area in temporary grasses. But, under war conditions, the object aimed at can only be reached by using other methods than that of increased yield alone.

The main increase in wheat for 1918 will have to be obtained on the existing arable area by taking a crop after clover or temporary grasses, after wheat or barley, after oats, after potatoes or roots, after peas or beans, or after fallows. But room must be made for the displaced crops on a new acreage which must be prepared and ready by the early spring of 1918.

The new area to be ploughed must be carefully chosen for the purpose of growing crops. There is no magic in ploughing up unsuitable land. Strong, heavy land, grass which is fully productive for milk, or for fattening cattle, fields which experience has shown to be ill-adapted for arable cultivation, should be left down. The whole of the land of the country should be carefully inspected in order to select that which is most suitable for arable cultivation. No rule of thumb methods, no attempts to equalise the burden by asking each farmer to plough the same proportion, are possible. The capability of each county, of each district, of each parish, and even of each farm in the parish, should be ascertained by a complete survey of land suited to increased arable cultivation. It is only by careful selection that the War Executive Committees will be able to carry the feeling of the landowning and farming community with them in the work. Without the general support of agricultural opinion, the attempt to increase the area under cereals and potatoes will inevitably end in failure.

War Executive Committees are asked to do their best to secure the required increase, and to report progress. They cannot be expected to attempt the task, unless the necessary labour, horses, fertilisers, and machines are supplied. But it is plain that, if the additional cereals are not grown, any diminution in the quantity heightens the possible privations of the nation and lessens the effectiveness of the agricultural answer to the submarine menace.

The Food Production Department are issuing a new set of figures calculated on the changed circumstances since the original programme was framed.

Sincerely yours,
R. E. PROTHERO.

THE following Memorandum, dated 4th July, has been addressed by the President of the Board of Agriculture to County War Agricultural Executive Committees:—

Use of Compulsory Powers.

I desire to remind the War Executive Committees of the words which I used on 20th December, 1916, in starting the movement for increased corn production:

> "We propose to give you (War Agricultural Committees) wide powers to enter upon, occupy, cultivate, and put in the seeds that we want grown, whether it is corn or potatoes, on the land which you yourselves find to be insufficiently cultivated or not cultivated at all. We mean you to have compulsory powers. I need not say to you that you will do it by persuasion wherever you can and make a bargain with the man to do it. But remember this. Behind persuasion you will have the driving force of compulsory power. I think it is absolutely necessary that you should have it . . . . You will do your duty not merely to your class as farmers, but do it to the nation ; and if you find it necessary, put the powers you will have into force."

The position has not altered. It remains the same to-day as it was six months ago. Speaking at Shrewsbury on the 1st June, 1917, I spoke as follows (according to the verbatim transcript of my speech):—

> "Of course, the Executive Committees have been delegated some very big powers. Now I do hope that they are not going recklessly to use them. I am not one of those who believe in a farmer being compelled to do anything. Try everything else first . . . . You must try and carry the farmer with you, and the only way to carry the farmer with you is by being prudent, and careful, and fair in your choice of land which you want to have ploughed up. Of course, I know the sort of feeling people have—that it must be equal—that if A has got to plough up 20 acres, then it is only fair that B should plough up 20 acres. But is it? . . . . I don't think it is. I think you have to look at each farm by itself. You have got to see the balance of the farm, and you have to consider no end of other things."

Compulsion is no less distasteful to the Board of Agriculture than it is to farmers; yet it may, in certain circumstances, become a necessity. It has, of course, its limits. Unless the Committee is prepared to cultivate the land itself, it must consider the tenant's experience of arable farming, his command of the necessary implements and other similar points. In all cases, the exercise of compulsory powers should always be the last resort; but in some it also remains the final resort. For instance, a piece of land is selected by competent advisers as suitable for corn, and less productive of animal or human food as grass than it would be under the plough. If the Executive Committee, after due consideration of all the circumstances, decide that the selected land must, in the interest of the nation, be ploughed up—and if negotiation, argument, conference and persuasion have been tried unsuccessfully with both owners and occupiers—then, all other means having failed, the Committee must preceed to compulsion, and will be supported by the Board.

The ploughing-up of pasture may entail a sacrifice. But that sacrifice is nothing in comparison with that which is daily made by the men who are fighting for us by land and sea; it is no greater, and is often much less, than that already demanded from many other industries and sections of the community. The nation needs the food. It cannot farm the land itself. It cannot make agriculture a controlled establishment. It is obliged, from the circumstances of the case, to leave food production in the hands of those who own, occupy, and till the soil. Just for that very reason it has the strongest claim on agriculturists to do their duty to the utmost.

THE following Memorandum, dated 26th June, 1917, was sent by the Food Production Department of the Board to Agricultural Executive Committees:—

Determination of Tenancies.

Where possession is taken of land under paragraph (1) (*a*) of Regulation 2M by an Agricultural Executive Committee on behalf of the Board of Agriculture, the contract of tenancy between the landlord and tenant has usually been allowed to continue. In many cases, the land taken over by the Committee forms only a comparatively small portion of the holding, and in these cases it is hoped that arrangements may be made by mutual consent between landlord and tenant for a readjustment of the tenancy, for an apportionment of the rent to the area of land retained by the tenant, and so on.

But there are also many cases where the Committee takes possession of an entire holding, or of the greater portion of a holding; and in such cases it may often be a hardship upon the tenant, if the contract between himself and the landlord remains in force. The tenant remains technically liable for the rent, although his possession may be suspended for a period of some years, as provided by the Defence of the Realm (Acquisition of Land) Act, 1916, and he may have taken another farm or found some other employment. At the end of that period, he will (unless in the meantime his tenancy has been determined by the landlord by notice to quit) as the person entitled to resume possession, be liable to pay to the Board the unexhausted value of all acts of cultivation or adaptation for cultivation executed during their occupation of the land. Under these circumstances, it would generally be fairer both to the tenant and to the landlord, and also desirable from the point of view of good cultivation that the contract of tenancy should be determined when possession has been taken of the land.

The Board have the power to determine the tenancy of an entire holding where necessary, under the conditions laid down in paragraph (1) (*f*) of Regulation 2M, and the Board will generally be prepared to exercise this power, on the recommendation of the Agricultural Executive Committee concerned, in any case in which possession has been taken of the whole or the greater part of a holding, and where it is thought fair that this should be done. Any direct and substantial loss borne by the landlord or tenant in consequence of this action may be the subject of an application for compensation to the Defence of the Realm (Losses) Commission, to be made according to the procedure indicated in the Circular F. P. 43, dated the 1st May, 1917,* and on any such application the landlord will be entitled to claim in respect of the compensation for tenant right, etc., which, under the contract of tenancy, custom or Agricultural Holdings Act, he has had to pay to the outgoing tenant on the determination of the tenancy.

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* See *Journal*, June, 1917, p. 355.

Agricultural Executive Committees are therefore requested when reporting any case for authority to take possession of land, to state at the same time whether they recommend that the tenancy of the holding should be determined, giving the reasons why this is recommended.

They are also requested to furnish this Department as soon as possible with a complete statement of the lands of which they have already taken possession, showing the area and situation of those lands together with the area of the holding of which they form part, and stating whether they recommend that the tenancy of the holding should now be determined, and, if so, for what reasons.

Where possession has been taken for a temporary purpose only, such as manuring, mole-draining or specific acts of cultivation, the above remarks are not intended to apply.

THE following Circular Letter, dated 12th June, was addressed by the Food Production Department of the Board to County Agricultural Executive Committees in England and Wales :—

The Duties of Supplies Sub-Committees.

SIR,—1. The letter from this Department of the 16th May* proposed the appointment by each Agricultural Executive Committee of a Supplies Sub-Committee to make provision for meeting the needs of the area as regards seeds, fertilisers, etc. The work this Sub-Committee is invited to perform is of the highest importance in view of the largely increased demand for materials which is likely to arise owing to the Food Production Policy, but it presents a number of special difficulties which can only be overcome by action on well-considered lines.

2. The requirements of the country in the coming season may differ appreciably from those of the period before the War, and it is necessary, while making the best use possible of existing distributing agencies, to devise measures which will enable Executive Committees to ensure that farmers are not prevented from giving effect to the Food Production Policy owing to lack of materials.

3. *Estimate of Requirements.*—The first step is to ascertain the probable requirements of the county. The survey which is to be carried out for the purpose of selecting the land to be ploughed for the harvest of 1918 affords a means whereby these requirements can be estimated with fair accuracy. The further requirements should be gauged and the results of the survey checked by consultation with the principal agricultural merchants and co-operative societies, from whom estimates of the probable demand based on the actual sales for the past season should be obtained. It is important that the requirements should be based on the minimum rather than the maximum quantities likely to be needed, as the available supplies are necessarily limited.

The principal articles which it is suggested Supplies Committees should have in view are seed-corn, clovers, rye-grass, root-seeds, seed potatoes, sulphate of ammonia, superphosphate, basic slag, lime, sulphate of copper, binder twine, and pipes for land drainage. Other articles which Committees may think necessary in view of local requirements should be added to this list.

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* See *Journal*, June, 1917, p. 344.

The result of the inquiries should be furnished to the Department as soon as possible. The Department will then endeavour to ensure that the requirements of the county are met, or that it receives a reasonable share of those articles of which the supply is very limited.

4. *Organising Distribution.*—One means which should immediately be considered by Committees as a step in the direction of organising distribution is the preparation of a list of co-operative societies, dealers and merchants who, on complying with the stipulations indicated below, should be recognised by this Department as "Approved Agents," for the supply of those commodities which may require special measures for their proper distribution. In order to secure a reasonable uniformity it will be necessary that the conditions on which the agents are recognised shall be submitted to this Department before action is taken.

By requiring these agents to maintain a sufficient stock of materials, and to sell at certain agreed prices, Committees could to a large extent ensure that farmers' requirements were promptly met.

5. Local storage is essential in the case of many agricultural requirements in order to prevent shortage in supply and delay in delivery owing to railway congestion. The recognition of a dealer, merchant or co-operative society as an "Approved Agent" should, therefore, be subject to a requirement that certain minimum quantities of seeds, fertilisers, etc., are stored on the agent's premises. Traders who are unable to offer satisfactory warehouse accommodation should not be recognised, but, subject to suitable undertakings being given, no firm of repute should be excluded from the list of "Approved Agents," as it is important to avoid the suspicion of favouritism. The minimum quantities to be stored need not be uniform, the essential point being that the agent should undertake to carry a stock appreciably higher than normal.

In addition to the increased quantities stored in the ordinary course of business, a consideration of local requirements may lead Committees to the opinion that further and special provision is necessary, and in such cases it would be open to them to arrange with "Approved Agents" for the storage of additional quantities on paying the charges involved.

6, Arrangements are being made with manufacturers in regard to the prices at which fertilisers and other articles should be sold by them at the works, and information on these points will be supplied to Committees from time to time as it becomes available. As the conditions applicable to each individual article vary, it is suggested that the appointment of an "Approved Agent" should be subject to an undertaking to sell those agricultural requisites in which he trades for cash at prices to be agreed.

In view of the special importance of storing sulphate of ammonia during the summer and autumn, in order to enable the works to continue production to the maximum extent, it may be necessary to require "Approved Agents" to take sulphate of ammonia into store, but in that case a suitable adjustment as to price will be made.

7. It is desirable that the purchases made by the Executive Committees on their own account should be made either through co-operative societies or through local firms agreeing to purchase on behalf of Committees at fixed rates of commission.

I am, etc.,

ARTHUR LEE,

Director-General.

Provision of Sulphate of Ammonia, Lime, and Drain Pipes.

THE following information respecting the provision of sulphate of ammonia, lime, and drain pipes has been sent by the Food Production Department of the Board in a letter dated 12th June, 1917, and addressed to the Agricultural Executive Committees.

1. *Sulphate of Ammonia.*—A notice is enclosed as to the prices at which sulphate of ammonia is to be sold during the season 1917–18.* It will be seen that a sliding scale of prices has been adopted, the object in view being to induce dealers, co-operative societies and farmers to take delivery in the summer and autumn: this is necessary in order to prevent production being interfered with owing to congestion of storage accommodation at makers' works.

2. Very much larger quantities of sulphate of ammonia must be reserved for application for next year's crops than the 140,000 tons used during last season. The quantity required for 1917-18 cannot be estimated at less than 200,000 tons, and it is hoped that it may reach 240,000 tons.

3. In order to secure that this supply shall be available for distribution when required, it is necessary to make provision as far as possible for storage locally, and steps should also be taken to secure its effective distribution to farmers.

4. With this object in view, I am to suggest that the appointment of the "Approved Agents" referred to in the letter from this Department of the 12th inst. (F. P. 56)† should be proceeded with at once, and that the choice of such agents should be made dependent on their undertaking to store a minimum quantity of 50 tons of sulphate of ammonia, and to maintain a stock at that rate up to the 30th March next.

5. The sliding scale of prices will enable agents to purchase sulphate of ammonia at £15 7*s*. 6*d*. per ton (less 10*s*. discount) during the period 1st June to 30th September, 1917, and to dispose of their stock to consumers in the three months October to December, 1917, at £15 15*s*., or in the subsequent five months, from January to May, 1918, at £16 7*s*. 6*d*. There is, therefore, sufficient financial inducement to dealers to incur the storage and capital charges involved, and, in addition, they will receive a valuable advertisement through being included in the lists of "Approved Agents" recognised by the Agricultural Executive Committees and by this Department.

6. Farmers in the district wishing to obtain supplies of sulphate of ammonia should be advised to purchase from them. Any applications from the district received direct by this Department will be referred to these agents. Such orders will not necessarily be met from the agent's store, but can be placed by him with the makers direct, and the agents will, in such cases, obtain the usual commission.

7. The stipulation that all "Approved Agents" shall be required to maintain stocks of sulphate of ammonia will avoid any appearance of discrimination in favour of any particular firm. Your Committee may also wish to take into account local considerations, and in particular to stipulate that the agents recognised shall undertake to sell other fertilisers at prices and on conditions to be agreed at a later date.

8. I am, therefore, to invite your Committee to take immediate steps to secure as many applications as possible from merchants, dealers and co-operative societies, who will be willing to maintain a minimum

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* See *Journal*, June, 1917, p. 372. † See p. 461.

stock of 50 tons of sulphate of ammonia. A form of application for this purpose is enclosed,* and a further supply will follow. I shall be glad if you will send signed applications to me as soon as they have been approved by your Committee.

9. *Lime.*—The output of agricultural lime at the present time is reduced to approximately one half of pre-war production, but the Department is taking steps to increase the supply.

10. Offers are being obtained from makers to supply lime at prices below those at present ruling, provided orders for substantial quantities are placed with them by the Supplies Sub-Committees. It is suggested that your Committee should consider the possibility of collecting orders from farmers so that bulk orders may be given to suitable firms. A later communication will be addressed to you on the subject, but meanwhile I shall much appreciate a considered estimate, if it can be made, of the probable total requirements of the county during the coming season. The knowledge so obtained will greatly assist the Department.

11. *Drain Pipes.*—A considerable amount of draining is likely to be necessary in the case of low patches of land in fields which are being converted into arable, and it is desirable that the Committee should consider whether the supply of drain pipes obtainable in their neighbourhood is likely to be sufficient to meet the demand during the coming season. If there is any possibility of a substantial demand, it will be necessary to make arrangements with manufacturers well in advance. The Department will be glad to receive a report on this subject in order that appropriate steps may be taken.

THE following Memorandum, dated 2nd June, 1917, has been sent by the Food Production Department of the Board to Agricultural Executive Committees :—

Petrol for Farmers.

The Food Production Department have been in communication with the Petrol Control Committee with reference to the supply of petrol to farmers, and arrangements have been come to which will ensure that every consideration shall be given to applications for petrol licences from farmers and others engaged in the essential work of producing food, provided that such applications have been examined and certified by the Agricultural Executive Committees for the county concerned.

In asking the Agricultural Executive Committees to undertake the work of examining such applications, the Food Production Department and the Petrol Control Committee feel that Agricultural Executive Committees are the only competent authorities possessing the requisite local knowledge to make recommendations that are fair and reasonable, having regard to the needs of the applicants and the paramount importance of economising the diminished supplies of motor spirit.

Petrol for Farmers for Use in Tractors, Stationary Engines and Motor Cars.—All applications by farmers for petrol licences must in future be made to the County Agricultural Executive Committees, who will assume the responsibility of making a recommendation on the form of application No. 95, issued by the Food Production Department, 214, Great Portland Street, London, W. 1. The application should be certified by the Chairman or Secretary of the Committee and sent direct to the Petrol Control Committee.

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* Not here printed.

In view of the very serious situation at present existing as regards the supply of motor spirit it will be necessary for the Executive Committees to exercise the utmost care in making their recommendations.

Each application must be subjected to close investigation with the object of deciding the minimum quantity without which, the applicant could not carry on his essential work of food production. The quantity required for agricultural machinery will, of course, depend upon the amount of work to be done, but in the case of motor lorries, the possibility of reducing the number of journeys should always be borne in mind. As regards motor cars used in the ordinary course of the farmer's work, the Petrol Control Committee are of opinion that an allowance of 10 gal. per month, which corresponds to an average mileage of 200, is adequate, but they are prepared to consider recommendations for an increase beyond this quantity in cases where, owing to exceptional circumstances, the production of food would be seriously hindered by such restriction.

The Executive Committee must take care not to make a recommendation unless the applicant indicates clearly the purpose for which the petrol is required, and furnishes all the information required in paragraphs 1, 2 and 3, of the Application Form. Licences are issued "Free-of-Duty" for motor spirit for use in agricultural machinery and lorries, but a duty of 6*d*. per gal. is payable on all licences for motor spirit for use in motor cars or motor cycles which are liable to Motor Car Tax (see Finance Act, 1916). In making recommendations the Executive Committees must therefore take particular care that the nature of the licence or licences recommended, is clearly stated.

THE following Memorandum, dated 8th June, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees:—

Control of Steam Tackle.

A desire has been expressed by several Executive Committees that they should be authorised to exercise some control over the sets of steam tackle in their counties. Under paragraph 1 (*b*) of Regulation 2M Executive Committees have power to take possession of any steam tackle (other than that in the possession or under the control of a dealer or manufacturer) if they are of opinion that it is required for the cultivation of land or the increase of the food supply of the country, but the Board think that as a general rule it would be unwise to requisition steam tackle from the present owners who in most cases are anxious that it should be as fully employed as possible. The Board understand, however, that in certain cases the owners of steam tackle are disposed to employ it mainly on land which could equally well be dealt with by motor tractors, with the result that arrangements cannot be made to plough up the class of grassland which can only be dealt with satisfactorily by steam cultivation.

The Board suggest, therefore, that the Machinery Sub-Committees should endeavour to organise the work of the sets of steam tackle in their counties in co-operation with the proprietors, so that they may be used to the best advantage in the national interest, and Executive Committees are authorised to guarantee to the proprietors payment for any work they undertake at the request or under the directions of the Committees. This should remove any unwillingness on the part of the proprietors of steam tackle to undertake work for which they might find difficulty in obtaining payment, and if payment is made by the Executive Committees the expenditure should be recovered in due course by the Committees from the occupiers of the land under paragraph 4 of Regulation 2M.

If the proprietors of any set of steam tackle decline unreasonably to carry out the requests or directions of an Executive Committee, the facts should be reported to the Board, who will consider whether they should authorise the Committee to exercise their power of commandeering under Paragraph 1 (*b*) of Regulation 2M.

Labour for the Hay and Corn Harvests.

THE following Circular Letter, dated, 19th June, 1917, has been addressed by the Food Production Department of the Board to the County Agricultural Executive Committees in England and Wales:—

SIR,—1. The Army Authorities have agreed to provide a number of soldiers to assist with the hay and corn harvest in England and Wales. The men will be available only until the end of the corn harvest in your district. It is unlikely that the number of soldiers will be sufficient to meet all the applications for harvest labour, and farmers must be prepared to accept any civilians obtained by the National Service Department, including the Public School boys, schoolmasters and others who have offered their services during harvest time.

2. The soldiers will be sent to certain Military Distribution Centres, and some of them will be available immediately. The Centre for your county will be at . . .

3. Farmers in your county requiring the assistance of these men must apply to your Committee on a form (F.P 71), a copy of which is enclosed,* stating that they agree to the terms under which the soldier is being lent. The form has been framed to meet cases in which civilians have to be supplied. Further copies of the form are being sent under separate cover, together with additional copies of this letter. It will be necessary for you to fill in at the foot of the application form the address to which it should be returned on completion.

4. In the case of the soldiers, when the farmer boards and lodges the men he will pay the rate of wage current in the district for harvest work for agricultural labourers who live in, subject to the minimum rates mentioned below. Otherwise he will pay the rate current for harvest work for agricultural labourers who live out, subject to the minimum rates mentioned below. In the event of any dispute as to what the current rate is, whether for men living in or out, the decision of the County Agricultural Executive Committee will be final. *The farmer will pay the soldier direct the amount due to him.* The hours of work will be those customary in the district.

For the hay harvest the minimum rates of wages will be as follows, but the local rate of wage must be paid if in excess of these minimum rates:—

(*a*) 5*s*. 0*d*. for each week-day while the soldier is employed (and each Sunday on which he works). Soldier to provide his own board and lodging. Overtime at the rate of 6*d*. per hour, after 10 working hours.

or (*b*) 2*s*. 6*d*. for each week-day while the soldier is employed (and each Sunday on which he works). Board and lodging to be provided by the farmer. Overtime at the rate of 6*d.* per hour after 10 working hours.

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* Not here printed.

For the corn harvest the minimum rates will be as follows, but the local rate of wage must be paid if in excess of these minimum rates :—

(*a*) Cambridgeshire, Essex, Huntingdonshire, Isle of Ely, Lincolnshire, Norfolk, Soke of Peterboro', Suffolk, the East and West Ridings of Yorkshire, and Rutland : 7*s.* 0*d.* for a day of 10 working hours, if the soldier provides his own board and lodging, or 4*s.* 6*d.* if board and lodging is provided by the farmer, with 6*d.* an hour overtime.

(*b*) For the remaining counties in England and Wales : 6*s.* for a day of 10 working hours, if the soldier provides his own board and lodging, or 3*s.* 6*d.* if board and lodging is provided by the farmer, with 6*d.* an hour overtime.

The above rates to be inclusive of all allowances, and to be paid wet or fine.

5. The farmer will not have to pay railway fares, but will be required to make arrangements, at his own expense, for the conveyance of men between the railway station and the farm, to provide all necessary tools and appliances, and to insure the men under the Workmen's Compensation Acts, but he will pay no contribution for Health Insurance.

6. Applications received on the prescribed form should be passed by your Committee to the Sub-Commissioner of the National Service Department for your county, in accordance with paragraph 5 of the agreement between the Board of Agriculture and the National Service Department (F P. 65). The Sub-Commissioner, who will be responsible for seeing that the labour required is supplied, has been instructed to place himself at once in communication with you, and it is hoped that with close co-operation between the Labour Officer of your Committee and the Sub-Commissioner of the National Service Department the soldiers will be despatched without loss of time to the farmers requiring their services. Time will be saved if Committees will forward application forms to the Sub-Commissioner, c/o the Officer Commanding the Distribution Centre, as the Sub-Commissioner will be constantly in attendance at the Centre assisting in the despatch of the men.

7. The rates of pay applicable to the civilians obtained by the National Service Department will be the current local rates for the hay or corn harvest with minimum rates of 25*s.* a week for living-out and 10*s.* a week for living-in. The terms and conditions of the employment of the school boy and other labour set out in the Board's Circular Letters of the 7th ultimo* and the 1st instant are not affected.

I am, etc.,
ARTHUR LEE,
Director-General.

Soldiers for the Hay and Corn Harvests‡

THE following Circular Letter, dated 29th June, 1917, was addressed by the Food Production Department of the Board, to the County Agricultural Executive Committees in England and Wales :—

SIR—1. With reference to the Circular Letter (F. P. 74)†, of the 19th instant, as to the labour provided for the hay and corn harvests, representations have been made that in many districts the soldiers lent by the Military Authorities will not be wholly employed on harvest work, inasmuch as a few weeks' interval will occur between the hay and corn harvests, during which time farmers engaging these soldiers will desire to employ them on general farm work.

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* See *Journal*, June, 1917, p. 341. † See p. 465. ‡ See also p. 482.

2. The Military Authorities have agreed that when the men are not actually engaged in harvest work, the following minimum rates of wages will apply instead of those specified in paragraph 4 of the Circular above-mentioned, namely :—

(*a*) 4*s*. 2*d*. for each week-day while the soldier is employed (and each Sunday on which he works). Soldier to provide his own board and lodging.

or (*b*) 1*s*. 8*d*. for each week-day while the soldier is employed (and each Sunday on which he works). Board and lodging to be provided by the farmer.

The local rate of wage must, however, be paid if in excess of the minimum rates. The hours of work will be those customary in the district.

3. In connection with the allocation of these men, Agricultural Executive Committees should remember that these soldiers have been lent to agriculture specially to assist with the hay and corn harvests, and applications for soldiers for such work must, therefore, be given priority over demands for men for any other class of farm work.

I am, etc.,
ARTHUR LEE,
Director-General.

THE following Circular Letter, dated 20th June, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees in England :—

Employment of Prisoners of War.

SIR,—Arrangements have now been made by which an additional number of military prisoners of war, who have had experience of agricultural work, are available for agriculture.

Agricultural Executive Committees are accordingly urged to forward at an early date further schemes for the employment of such prisoners on the land. Batches of prisoners of war, either military or civilian, can also be supplied for carrying out drainage schemes that are likely to increase production for the 1918 harvest.

In this connection it is to be noted that in the case of all the schemes under which prisoners are already being employed in agriculture, their work has given great satisfaction, and in nearly every case application has been made for more to be supplied.

The conditions of employment will be those described in the Circular Letter (A. 287/C), dated the 16th January last,* except that in special cases the minimum size of a batch may be reduced to not less than 40 men, and the guard is now calculated at one-third of the number of prisoners sent. A copy of the Circular Letters referred to is enclosed. Any schemes submitted should be on the lines of the enclosed draft.

I trust that your Committee will give this matter their very early attention, as it is important that the services of these prisoners should be utilised to the greatest possible extent.

I am, etc.,
ARTHUR LEE,
Director-General.

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* See *Journal*, March, 1917, p. 1134.

THE President of the Board of Agriculture has issued the following appeal :—

Woman Labour on the Land.

The nation needs all the food that can be raised from the land at home. Whether farmers plough up grass or increase production on their existing arable area, or do both, they must have the necessary labour. They naturally like it best in the form to which they are most accustomed. Men who know the ways of the land and of their masters cannot be exactly replaced by strangers. Changes of staff cause trouble. But there is no choice. Labour must be found. Farmers, anxious as they are to do their duty by the nation, cannot reject without a trial, and, if need be, a patient trial, help from any quarter in which it is offered.

Women are ready and able to work on the land, however hard and disagreeable it may be. They have heard the country's call. They have answered generously and patriotically the appeal for their help. Those who live in their own homes on the spot have loyally come forward in large numbers. Farmers are glad of their services, and have learnt by experience how useful a women can be, even if she can only give half a day at a time.

There are also other women who offer to leave their homes, to pass through a course of training, to go wherever they are sent, to give their whole time on the farms, and within the limits of their physical strength to do whatever they are asked. Hundreds are already employed. But hundreds more are waiting to be hired. They cannot be expected to make their offer a second time or to wait for ever.

In the care of stock, in milking, in the management of horses, in all the odd jobs of a farm, in the ordinary field work, such as weeding, hoeing, or singling, the help of women has been again and again proved to be invaluable.

There are difficulties in housing whole-time women. But with goodwill on all sides these difficulties can be met. Every one who offers hospitality to women workers on the land is helping to win the War. Women are in addition to, and not in substitution for, the men already employed. No farmer, therefore, risks the loss of male labour by their employment.

Farmers cannot afford to allow woman labour to stand idle. They will gain, and the nation will gain, if it is put to the fullest possible use.

For all particulars of woman labour, application should be made to the Director-General, Food Production Department, 72, Victoria Street, S.W. 1, or to the County Organising Secretary in each county.*

THE following Notice, dated, 12th June, 1917, has been issued by the Food Production Department of the Board :—

Seed Wheat of the 1916 Crop.

In view of the necessity of providing seed wheat for early sowing next season the Food Production Department are prepared to buy seed wheat of the 1916 crop threshed after the 1st June. Wheat offered must be dry, *well cleaned*, free from smut, weeds and sprouted corn, and of good natural weight, and the Department will, until further notice, be prepared to offer for such wheat a premium above the maximum price for milling wheat.

Farmers who have wheat which they believe to be fit for seed for early autumn sowing are asked to offer the grain to the merchant with whom they usually deal, and at the same time to state the variety and approximate quantity. The merchant will submit a sample to the local Seed Wheat Purchasing Committee, who will decide at once whether the grain is suitable. If the Committee pass the sample, the merchant will complete the purchase of the wheat at the price authorised by the Committee and will arrange all further details of the transaction.

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* See also p. 482.

THE following Notice, dated 16th June, 1917, has been issued by the Food Production Department of the Board :—

Seed Wheat of the 1917 Crop.

In view of the importance of providing seed wheat for next year's harvest, the Government propose to acquire pure stocks of certain of the less plentiful varieties of autumn wheats. Crops in adequate quantity found after inspection to be suitable for seed will be purchased at a substantial premium above the milling price. Farmers with pure crops of not less than 20 acres of the following varieties, viz. : Wilhelmina, Victor, Little Joss, Browick, *are requested to communicate at once* with the Director-General, Food Production Department, 72, Victoria Street, London, S.W. 1.

Details are not at present desired of other more plentiful varieties of which it is expected adequate supplies will be available.

In writing to the Department the correspondent should state his name and address, the variety of wheat, the area sown, and the location of the crop.

In a Circular Letter, dated 23rd June, 1917, addressed by the Food Production Department of the Board to the Agricultural Executive Committees, the following information respecting supplies of seed wheat for autumn sowing is sent for the consideration of the Supplies Sub-Committees :—

Supplies of Seed Wheat for Autumn Sowing.

1. In order that provision may be made for the increased quantity of seed wheat that will be required for early autumn sowing in the coming season, the Department is making arrangements for the purchase and storage of varieties of the 1916 crop threshed after 1st June and suitable for sowing in the autumn.

2. The National British and Irish Corn Trade Association is setting up local Seed Wheat Purchasing Committees, who will act on behalf of the Department in the purchase of the grain. Farmers who have wheat which they believe to be fit for early autumn sowing are being asked to offer it to the merchant with whom they usually deal. The merchant will submit a sample to the local Seed Wheat Purchasing Committee, who will decide at once whether the grain is suitable. If the Committee pass the sample they will authorise the merchant to purchase the grain for this Department and inform him of the name and address of the storage agent to whom it is to be consigned.

3. Supplies Sub-Committees should at once arrange to collect and forward to the Department orders for supplies of this seed for autumn sowing. The price of good, sound, dry, well-cleaned seed will not exceed 92*s.* 6*d.* per quarter of 504 lb. f.o.r. at store. Reasonable precautions will be taken to select suitable wheat for sowing, but no warranty expressed or implied will be given as to quality, purity or productiveness.

4. A large quantity of suitable seed of the 1916 crop is not likely to be available: farmers should therefore be urged to place their orders as soon as possible. It is desirable that they should name two or three alternative varieties in case the one which they prefer cannot be supplied.

5. In addition to the arrangements for the purchase and storage of suitable seed wheat of the 1916 crop, the Department is preparing a scheme for the purchase of selected varieties of the 1917 crop, particulars of which will be communicated to Supplies Sub-Committees at an early date.

Poultry Advisory Committee.

A NOTICE, dated 15th June, 1917, stated that the President of the Board of Agriculture and Fisheries has appointed an Advisory Committee to consider and report upon technical questions of poultry management and feeding, both in general and in detail, and on general questions of the organisation of the poultry industry, with a view to securing that the readjustment of the industry to war conditions shall be made in the most approved manner. The question whether the Board's scheme for distributing sittings of eggs* should be continued for the season 1917–18 or not is also referred to the Committee.

The Committee is constituted as follows :—

Mr. T. W. Toovey (*Chairman*)	National Utility Poultry Society.
,, Gerald Martin	Ministry of Food.
,, P. A. Francis	Board of Agriculture for Scotland.
,, Wilfred Buckley ..	Agricultural Organisation Society.
,, Tom Barron	National Utility Poultry Society.
,, W. G. Tarbet	Utility Duck Club.
,, Tom Newman	Scientific Poultry Breeders' Society.
,, C. Longbottom ..	Northern Utility Poultry Society.
,, F. M. Youngman, J.P.	Framlingham and Eastern Counties Egg and Poultry Co-op. Society.
,, G. Tyrwhitt Drake ..	Poultry Club.

Also a representative, when required, of the Poultry Research Society.

Mr. J. R. Jackson, Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, S.W. 1.

At the first meeting of the above Committee, on the 8th June, several resolutions were passed and presented to the President of the Board for consideration. Among the resolutions under consideration is one which supplements advice already given by the Board, and to which Mr. Prothero wishes to give immediate effect by advising poultry-keepers to follow the opportune and practical suggestions it contains. The resolution is as follows :—

> "That all hatching should cease for 1917; that all old stock cocks should be killed at once; that, with the exception of certain hens selected for breeding stock, all hens hatched in 1915 or earlier that go broody and show signs of moult should be cleared as well as any 1916 hens that indicate by their appearance that they will not be profitable; that, as soon as possible, all 1917 hatched cockerels not required for stock purposes in 1918 should be killed."

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* See p. 391.

An Order, dated the 14th June, 1917, has been made by the Board of Agriculture and Fisheries, providing that :—

The Sale of Horses Order, 1917.

The following bodies and persons are hereby authorised to exercise on behalf of the Board the power of issuing licences under Regulation 2T,[*] that is to say :—

(*a*) In the case of an agricultural holding situate wholly or partly in an administrative county having a War Agricultural Executive Committee constituted under the Cultivation of Lands Order, 1917 (No 3), that Committee;

(*b*) In the case of an agricultural holding situate wholly in the administrative county of London, the clerk of that council,

(*c*) In the case of an agricultural holding situate wholly in the city and county borough of Birmingham, the War Agricultural Executive Committee constituted under the Cultivation of Lands (Birmingham) Order, 1917 (No. 2); and

(*d*) In the case of an agricultural holding situate wholly in any other county borough, the clerk of the borough council.

Schedule.

2T—1 An occupier of an agricultural holding in Great Britain shall not sell or part with the possession of any horse used, or capable of being used, for the cultivation of the holding except with the authority of a licence granted under this Regulation

2 The Board of Agriculture and Fisheries in relation to any holding in England or Wales may by licence authorise the occupier of a holding to sell or part with the possession of a horse, if the Board are satisfied that the cultivation of the holding will not be thereby prejudiced, or that for any other reason the issue of such a licence is necessary or desirable, and any licence so issued may contain such conditions as the Board think desirable

3 The Board hereinbefore referred to may authorise any person or any body constituted by the Board under these Regulations to exercise on behalf of the Board the power of issuing licences under this Regulation.

4. Any person who sells or parts with the possession of a horse in contravention of this Regulation or fails to comply with any condition of a licence issued under this Regulation, and any person who buys any horse which he knows to be sold to him in contravention of this Regulation shall be guilty of a summary offence against these Regulations.

The following Circular Letter, dated 19th June, 1917, has been addressed by the Food Production Department of the Board to the County Agricultural Executive Committees and County Borough Councils in England and Wales, and the London County Council :—

Prohibition of Sale of Agricultural Horses.

SIR,—1. With the object of retaining an adequate supply of horses on the land a Regulation (2T) has been made under the Defence of the Realm Consolidation Act, 1914, prohibiting the sale of any horse used or capable of being used for the cultivation of the land except under licence. The

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[*] See Schedule below.

Board of Agriculture and Fisheries are empowered to delegate the power of granting licences to any person or to any body constituted by the Board.

2. Acting under this Regulation the Board have made the Sale of Horses Order, 1917 (with which the Regulation is embodied),* delegating to the Agricultural Executive Committees the power to issue licences for such sale. For London and County Boroughs in which no Agricultural Executive Committee exists, these powers are delegated to the clerks of the County Council and County Borough Councils.

3. The Order prohibits an occupier of any agricultural holding selling or parting with the possession of any horse used or capable of being used for the cultivation of the holding, except with the authority of a licence which may be granted if the Executive Committee or other authority named in the Order is satisfied that the cultivation of the holding will not be thereby prejudiced or that for any other reason the issue of such a licence is necessary or desirable, and any licence so issued may contain such conditions as the Executive Committee or other authority may think desirable. For the purposes of this Regulation and Order "agricultural holding" means any piece of land which is wholly agricultural or wholly pastoral, or part agricultural and as to the residue pastoral, or in whole or in part cultivated for the purposes of the trade or business of market gardening, and "occupier" includes any person for the time being having the management of the holding.

4. In considering the question as to whether the cultivation of a holding will be prejudiced by the sale of a horse, the Board desire that regard should be had to the proper working of any additional land which might reasonably be brought into cultivation by the occupier of the holding for the harvest of 1918.

5. The expression "any horse used or capable of being used for the cultivation of a holding" should as a general rule, be considered to include unbroken horses, suitable for farm work, of two years old and upwards, and in view of the urgent need for horses for agricultural purposes such horses should be broken in forthwith.

6. In granting any licence authorising a sale the Committee should satisfy themselves that the vendor intends to sell the horse (if suitable for the purpose) to an occupier of an agricultural holding, or to a person duly authorised by the Board of Agriculture and Fisheries or the Army Council to purchase the horse for Government purposes, and this should be secured by a condition of the licence unless there are any special circumstances that justify its being waived. This condition has been inserted in the form of licence sent herewith,† and should be struck out if not required. A space has been left for the insertion of any special condition imposed in a particular case.

In every case it should be made a condition that the detachable part of the licence should be signed by the licensee and the person to whom the animal is sold or transferred, and returned to the authority granting the licence within three days after the sale, or in any event within 21 days of the date when the licence was issued. The number should be inserted on both parts as well as on the counterfoil at the time of issue.

7. The Board have under consideration a scheme which has as its object the purchase of any horses which are surplus to farmers' own

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* Printed above. † Not here printed.

requirements for use in connection with the cultivation of a largely increased area of land for the harvest of 1918, so as to provide a supply of horses which will supplement any that may be rendered available by the military authorities for that purpose

8. In order to facilitate the purchase or better distribution of any surplus horses for agricultural purposes or when necessary for Army requirements, you are requested to issue a notice forthwith, inviting farmers within your area who have surplus horses for sale to notify you of that fact, giving the necessary particulars, and after such offers have been reviewed to ascertain whether the horses can be considered as surplus to the farmers' requirements, to forward a list to this Department each week

I am, etc.,

ARTHUR LEE,
Director-General

Swine Fever (Regulation of Movement) Order, 1917.

THE following Circular, dated 8th June, 1917, has been addressed by the Board of Agriculture to Local Authorities in Great Britain under the Diseases of Animals Acts, 1894 to 1914 —

1 The President of the Board of Agriculture and Fisheries has had under consideration the general restrictions at present in operation in Great Britain under the Swine Fever (Regulation of Movement) Order of 1908 on the movement of swine between the various Scheduled Areas into which Great Britain is divided for the purposes of that Order.

2 In all the existing circumstances, Mr Prothero has decided, with the view of facilitating the movement of swine to make the following modifications of the present arrangements and restrictions, namely —

(*a*) To amend the provisions of the Swine Fever (Regulation of Movement) Order of 1908, so as to afford additional facilities in certain cases for movement from one Scheduled Area to another for breeding and feeding purposes

(*b*) To withdraw entirely the Swine Fever (Special Areas) Orders of 1911 and 1912, which restricted movement into certain Scheduled Areas in Scotland, Wales, and the North of England, from the remainder of Great Britain, to swine required for breeding purposes only, and

(*c*) To enlarge certain of the Scheduled Areas, and thus to extend considerably the areas of free movement

3 In order to give effect to that part of the President's decision referred to in (*a*) of the previous paragraph, an Order has been made by the Board, entitled the Swine Fever (Regulation of Movement) Order of 1917 *

Article 1 of this new Order permits of the movement of a sow under a licence (Form A) to premises in a Scheduled Area from premises outside that area and back again to the premises from which it was originally moved, if the sow is moved for the purpose of being stocked, and the double movement takes place within the 8 days or less period during which the licence is available It is not intended that this provision should be utilised for the purpose of authorising long-distance movements for breeding purposes, but only for movement to and from a neighbouring boar on premises which are in an adjoining Scheduled

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* Not here printed.

Area. The Board suggest that the inspectors of the local authority should be instructed to exercise their discretion in the matter of the issue of licences in this connection.

Article 2 allows movement for feeding purposes to premises authorised for the purpose by the local authority of the district, of any swine (including swine which at present are permitted to be moved only to a bacon-factory or slaughterhouse) provided that the movement is authorised by a licence (Form C) granted by an inspector of the local authority of the district in which the authorised premises are situate. *All* pigs moved to premises so authorised as well as *all* pigs (if any) already on the premises at the time the premises are authorised, are required by the new Order to be detained on the premises until moved under a further licence (Form C), to a bacon-factory or slaughterhouse or until slaughtered. The object of this Article is to facilitiate the movement of pigs for feeding until ready for slaughter, especially immature pigs sent to a market from which under the conditions hitherto obtaining they could be moved only direct to a bacon-factory or slaughterhouse. Pigs from Ireland landed under the Swine Fever (Movement from Ireland) Order of 1904, and pigs exposed at Birmingham and Newcastle-upon-Tyne markets come within the scope of this provision.

The Order does not in any way alter the restriction on movement into or out of a Swine Fever Infected Area or Swine Fever Infected Place.

4. The proposals contained in (*b*) and (*c*) of the second paragraph of this letter, have been embodied in three new Application Orders, which re-define the limits of the Scheduled Areas which it has been decided to enlarge, and revoke the existing Application Orders. These Orders are entitled respectively, the Swine Fever (Regulation of Movement) Application Order of 1917 (No. 1), the Swine Fever (Regulation of Movement) Application Order of 1917 (No. 2), and the Kent and Surrey (Swine Fever) Order of 1917. The Application Order (No. 2) revokes, amongst other Orders, the Swine Fever (Special Areas) Orders of 1911 and 1912.

The general effect of these three Application Orders is to reduce the number of Scheduled Areas in Great Britain from 38 to 15, as well as to abolish the special restrictions contained in the Swine Fever (Special Areas) Orders as already explained. No alteration is made in the existing Application Orders which constitute the Scheduled Areas of Norfolk, Suffolk, Essex, London, East and West Sussex, and Yorkshire (West Riding), but the modifications made by the Swine Fever (Regulation of Movement) Order of 1917, described in the third paragraph of this letter apply, of course, equally to all Scheduled Areas.

THE Army Council issued an Order, dated 22nd June, 1917, to the effect that :—

Sale of Wool (Great Britain) Order, 1917.

1. No person shall sell raw wool grown or to be grown on sheep in Great Britain and the Isle of Man during the season of 1917, including fleece wool and skin wool, but not including daggings, locks, brokes and fallen wool, otherwise than to persons authorised by or on behalf of the Director of Army Contracts, or at prices other than those set out in the Schedules hereto annexed or at such other prices as in any particular case may be allowed by or on behalf of the Director of Army Contracts.

2. No person shall sell raw wool (as hereinbefore defined) grown or to be grown on sheep in Ireland during the season of 1917 otherwise than in accordance with the provisions of the Sale of Wool (Ireland) Order, 1917.

3. No person shall make or take delivery of or payment for any wool of the description aforesaid otherwise than in accordance with the provisions of this Order, whether in pursuance of any contract entered into prior to the date hereof or otherwise.

4. All persons having in their custody or control any stocks of wool of the description aforesaid are hereby required to sell such wool to any persons authorised by or on behalf of the Director of Army Contracts as may be required by him or on his behalf, and to make deliveries to such persons in such quantities and at such times and places as may be specified by him or on his behalf.

5. No person shall mix or wind in any fleeces of the description aforesaid any brokes or dead wool, locks, daggings or other matter whatsoever.

6. The Order made by the Army Council relating to raw wool grown or to be grown on sheep during the season of 1917, and dated the 5th day of April, 1917, is hereby cancelled.

SCHEDULE A.

PRICE LIST FOR ENGLAND.

Class of Wool.	*Pence per lb.*	*Class of Wool.*	*Pence per lb.*
Lincoln Hogs and Wethers ..	18	Devon, Cornwall and Somerset Strong Greasy	14½
Notts, Leicester and Yorks Hogs and Wethers	18½	Devon, Cornwall and Somerset Crossbred Greasy	15
Border Leicesters	18	Devon, Cornwall and Somerset Horns	15¾
Lincs and Yorks Halfbreds ..	19	Cluns and Best Kerries ..	19¾
Notts, Yorks, Wolds and Leicester Halfbreds	20	Fine Radnors	18
Norfolk Halfbreds	20	Deep ,, ...	17
Staffs ,, ...	20¼	Best Welsh Fleeces	16
Shropshire, Oxford and Hants Downs	21¼	Low ,, ,, ...	14½
Wilts	22¾	Scotch Washed	14½
Dorset and Sussex Downs and Horns	23½	,, Unwashed	12¾
Eastern Counties Downs ..	21	Massams	15
Kent Tegs	20½	North Halfbred Hogs ..	19
,, Ewes and Wethers ..	18¾	,, ,, Wethers ..	18¾
,, Halfbreds	21	Herdwick	12½
,, Downs	21¼	Wensleydale	19
Cotswold, Somerset and Glos. Deep Washed	17½	English Cheviots, Washed ..	18½

SCHEDULE B.

PRICE LIST FOR WALES.

Class of Wool.	*Pence per lb.*	*Class of Wool.*	*Pence per lb.*
Shropshire	21¾	Scotch	13¾
Best Kerry and Clun Forest ..	20¾	Shropshire Shorn Lamb ..	18
Best Radnors	18¾	Kerry and Clun Forest Shorn Lamb	16¾
Kempy Radnors or Crossbreds	17	Radnor and Crossbred Shorn Lamb	15
Best Welsh	16	Welsh Shorn Lamb	13
Low ,, ...	14½		
Turbary Welsh	13		

The above prices are maximum prices for well-washed wool in light condition (except where otherwise stated), packed and delivered free within reasonable distance.

SCHEDULE C.

PRICE LIST FOR SCOTLAND.

Class of Wool.	*Washed.*	*Unwashed*
	Pence per lb.	
Cheviot Hogg North ..	22½	18
,, Ewe ,, ..	18¾	16½
Clips 1/5th Hogg ..	20½	16¾
Cheviot Hogg Border ..	20¼	16¾
,, Ewe ,, ..	18¾	15¾
Clips 1/5th Hogg ..	18¾	15¾
Half Bred Hogg North .	19½	16½
,, Wether ,,	18¾	15¾
Clips Half Hogg ..	19½	15¾
Half Hogg South ..	19½	15¾
Half Bred Ewe ..	18½	15¾
Clips Half Hogg ..	18¾	15¾
Shrop. Hogg	20½	16¾
,, Ewe	18¾	15
Leicester Hogg and Ewe Clips ,, ,,	18	15½
Cross Hogg and Ewe ..	15¾	14½
Black-faced Hogg and Ewe ..	14½	12¾
,, Fallen ..	—	11¾

The above prices are maximum prices for wool in good condition, packed and delivered free within reasonable distance.

SCHEDULE D.

PRICE LIST FOR ISLE OF MAN.

Class of Wool.	*Pence per lb.*
Shropshire	16
Shropshire and Manx Cross ..	16
Cheviot	16
Leicester	15
Lincoln	15
Leicester and Scotch Cross ..	13
Black-faced Scotch	12

The above prices are maximum prices for unwashed wool, best quality, in good condition, packed and delivered free at warehouse.

THE following Letter, dated 28th June, 1917, has been addressed by the Ministry of Food to the Board of Agriculture:—

Price of Cereal Screenings.

SIR,—I am directed by the Flour Mills Control Committee to inform you that any screenings extracted from wheat or other cereals shall from this date be sold at a price not exceeding £15 per ton net weight at the mill door.

Any charges for delivery to be added to the invoice.

Sacks if supplied are to be charged for as a separate item.

I am, etc.,
F. W. DAWSON.

WITH reference to the Army Council Order of 9th May,[*] relative to the use of straw, it is notified by the Secretary of the War Office that the Army Council wish it to be understood that the prohibition of the use of wheat straw for litter will be withdrawn on 11th October.

Restrictions on the Use of Wheat Straw.

Any farmer in the meantime who is in any special difficulty can apply to the District Purchasing Officer of Supplies for a licence to use straw as litter or for any other purpose, and such licence will not be unreasonably withheld.

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[*] See *Journal*, June, 1917, p. 364.

Permission to Import Gooseberry Plants into Sweden.

BY an Order dated 14th April, 1917, the prohibition hitherto in force of the importation into Sweden of gooseberry plants from abroad has been suspended until further notice, the condition attached being that the plant shall be accompanied by a certificate from an official plant pathologist to the effect that the plants have been disinfected before exportation.

Cartridges and Shot.

THE following Memorandum, dated 27th June, 1917, has been sent by the Food Production Department of the Board to Agricultural Executive Committees in England and Wales:

This Memorandum supersedes all previous instructions issued to Agricultural Executive Committees on the subject of shot-gun ammunition.

In view of the imperative necessity for economy in the use of lead and other components, the Minister of Munitions is desirous of restricting the use of shot-gun ammunition to the destruction of vermin and the preservation of crops.

At the instance of the Minister of Munitions it has been made illegal by the Army Council (under the powers vested in them by the Defence of the Realm Regulations) for retailers to sell shot-gun ammunition to consumers except upon the production of a purchase licence duly issued by an Agricultural Executive Committee, and such licences shall only be issued when the Committee consider that the ammunition is absolutely necessary for the purposes named. Under Army Council Instruction 945 of 1917, orders are being issued by the Competent Military Authorities making the purchase of shot-gun ammunition illegal, unless covered by a licence in the approved form.

By Army Council Instruction 945 of 1917, "The authority for issuing licences for shot-gun ammunition has been delegated to the War Agricultural County Executive Committees in England and Wales, to whom all applications must be made." Purchase licences are licences for consumers to purchase by retail for their own use, and are in Form 23A.

A number of copies of this form are sent herewith,* and further copies will be sent on application. No other form should be used, and any stock of forms previously in use should be destroyed or used as waste-paper. The form speaks for itself. No name of any vendor should be inserted.

The licensing of vendors to sell shot-gun ammunition is in the hands of the Competent Military Authority. Agricultural Executive Committees are not concerned with it, but only with the issue of licences to consumers to purchase ammunition for their own use for the destruction of vermin and the preservation of crops; they are not authorised to license the purchase of ammunition for shooting game (except so far as this is done for the protection of crops) or for the destruction of vermin to preserve game. The licences should be issued in the most sparing manner possible.

Agricultural Executive Committees should not entertain any application for a licence for the purchase of ammunition except for use within the county, or within an adjoining county borough. Persons who desire to purchase ammunition for use in any other county should be referred to the Agricultural Executive Committee for that county.

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* Not here printed.

Subject to the limitation of the amount of material which is available for manufacture into shot-gun ammunition, the Minister of Munitions has left manufacturers free to supply vendors on the ordinary lines of the trade. As the licence does not contain the name of a vendor it will be open to the licensee to apply to any vendor for the amount of ammunition covered by the licence.

In order to be able to regulate the future supply of materials, the Minister of Munitions is anxious to be kept informed of the amount of shot-gun ammunition of which the purchase is licensed. Agricultural Executive Committees should, therefore, keep a record of the amount licensed by them, and should furnish to this Department before the 10th of each month the total quantity of each kind of shot-gun ammunition licensed in the preceding month. The first report should be furnished not later than 10th August.

Harvest Weather Forecasts.

THE Meteorological Office will, as in past years, but subject to certain restrictions, supply forecasts of weather by telegraph to persons desirous of receiving them, upon payment of a registration fee of 1*s.* and the cost of the telegrams, computed at 9*d.* per day. The supply of forecasts will continue until 30th September. The forecasts are drawn up each week-day at 3.30 p.m., and refer to the probable weather during the 15 hours from 6.0 a.m. to 9.0 p.m. on the next day. The addition of a "further outlook" and the issue of notifications in connection with spells of settled weather are suspended during the War.

Applications for the forecasts should be sent to the Director, Meteorological Office, South Kensington, London, S W., with a cheque or postal order payable to the Meteorological Committee, to cover the cost of the telegrams for the period, which should not be less than 6 consecutive days, during which the forecasts are to be sent.

The Stone Fruit (Jam Manufacturers' Prices) Order, 1917.

AN Order, dated 6th July, 1917, has been made by the Food Controller to the effect that:—

1. A person who for purposes of sale manufactures jam, or bottles, or otherwise in any form preserves fruit (hereinafter called a jam manufacturer), shall not after the date of this Order by himself or his agent buy or agree to buy for the purposes of such manufacture or preserving any fruit of the varieties mentioned in the Schedule at a price exceeding that specified as applicable thereto, or pay to the seller or his agent in respect of such fruit any charges other than those permitted under this Order.

2. The price specified shall in all cases include all charges for picking and packing.

3. Where the fruit is bought to be placed on rail, ship or barge at the grower's station, port or wharf, the specified price in such case is the price, free on rail, ship or barge.

4. The additional charges permitted under this Order are:—

(*a*) Where the fruit is delivered by the seller to the purchaser's premises, or for sale in a market, the customary charges in respect of such delivery, not exceeding in any case an amount equal to the reasonable cost of transport from the grower's railway station, port or wharf to the purchaser's premises or the market where sold

(*b*) For the use of baskets or usual packages (other than sacks) a charge not exceeding the rate of 25*s* per ton of fruit.

(*c*) All market tolls actually paid in respect of the fruit.

5. Where a jam manufacturer employs an agent in the purchase of any fruit to which this Order applies, he shall not pay to such agent a commission or other remuneration exceeding 12*s*. 6*d*. per ton of such fruit bought through the agent

6. Where any fruit to which this Order applies is bought by or on behalf of a jam manufacturer such fruit shall, until the contrary be proved, be deemed to be bought for the purpose of manufacturing jam or preserving fruit for sale

7. A person shall not knowingly sell or offer to sell to a jam manufacturer for the purpose of manufacturing jam or preserving fruit for sale any fruit to which this Order applies at a price or subject to a charge not permitted under this Order.

8. A person shall not in connection with a purchase or disposition or proposed purchase or disposition of any fruit to which this Order applies enter or offer to enter into any fictitious or artificial transaction.

9 This Order shall not apply to any fruit grown outside the United Kingdom.

THE SCHEDULE

Variety of fruit.	*Price at rate per ton.* £	s	d
Egg Plums . .	10	10	0
Other Plums .	12	10	0
Farleigh or Kent Damsons	12	0	0
Pin, or Prune or other Damsons	14	0	0
Greengages . . .	22	0	0

The Raspberries (Manufacturers' Prices) Order, 1917.

AN Order, dated 10th July 1917 has been made by the Food Controller to the effect that —

1. A person who for the purposes of sale manufactures jam or essence from raspberries (herein aftercalled a jam manufacturer) shall not, after the date of this Order by himself or his agent buy or agree to buy for the purposes of such manufacture any raspberries at a price exceeding a rate of £35 per ton, or pay to the seller or his agent in respect of such raspberries any charges other than those permitted under this Order

2. The price specified shall include all charges for picking and packing

3. Where the raspberries are bought to be placed on rail, ship or barge at the grower's station, port or wharf, the specified price in such case is the price, free on rail, ship or barge.

4. The additional charges permitted under this Order are —

(*a*) Where the raspberries are delivered by the seller to the purchaser's premises, or for sale in a market, the customary charges in respect of such delivery, not exceeding in any case an amount equal to the reasonable cost of transport from the grower's railway station, port or wharf, to the purchaser's premises or the market where sold.

(*b*) For the use of tubs, baskets, or usual packages, a charge not exceeding the rate of 25*s*. per ton of raspberries.

(*c*) All market tolls actually paid in respect of the raspberries

5 Where a jam manufacturer employs an agent in the purchase of any raspberries, he shall not pay to such agent a commission or other remuneration exceeding 20s per ton of such raspberries bought through the agent.

6. Where any raspberries are bought by or on behalf of a jam manufacturer such raspberries shall until the contrary be proved, be deemed to be bought for the purpose of manufacturing jam or essence for sale.

7 A person shall not knowingly sell or offer to sell to a jam manufacturer for the purpose of manufacturing jam or essence for sale any raspberries at a price or subject to a charge not permitted under this Order

8 (*a*) Where any contract subsisting at the date of this Order for the purchase of raspberries bought for the purpose of manufacturing jam or essence for sale or bought with a view to the same being resold for such purpose provides for payments in excess of those permitted under this Order, the contract shall stand so far as concerns any raspberries delivered on or before the date of this Order but otherwise shall be avoided

(*b*) For the purpose of this clause raspberries bought in quantities of 5 cwt or more shall until the contrary be proved be deemed to have been bought for the purpose or with the view aforesaid

(*c*) This clause shall not apply to any contract where the Food Controller otherwise determines or where the amount of raspberries agreed to be delivered or at the date of this Order remaining to be delivered is less than 5 cwt

9 A person shall not in connection with a purchase or disposition or proposed purchase or disposition of any raspberries enter or offer to enter into any fictitious or artificial transaction

10 This Order shall not apply to any raspberries grown outside the United Kingdom

AN Order, dated 10th July, 1917, has been made by the Food Controller to the effect that —

The Raspberries (Scotland) Delivery Order, 1917.

1 Any contract to the contrary notwithstanding all raspberries grown in Scotland shall, as picked, be delivered to the Food Controller by the grower in accordance with the instructions of a person nominated for the purpose by the Food Controller and such raspberries when so delivered shall become the property of the Food Controller and will be paid for as to raspberries in good condition at the maximum prices applicable to raspberries under the Raspberries (Manufacturers' Prices) Order, and no raspberries grown in Scotland shall be delivered to any other person or on any other terms except under and in accordance with the terms of a licence granted by the Food Controller.

2. This Order shall not apply to a grower of raspberries whose total crop does not exceed 1 cwt.

The Standing Timber (United Kingdom) Order, 1917.

AN Order, dated 4th July, 1917, was made by the War Office to the effect that:—1. From the date hereof until further notice no person shall, without a permit issued by or on behalf of the Controller of Timber Supplies, buy any standing timber in the United Kingdom provided that nothing herein contained shall apply—

(1) to any purchase of real estate having timber standing thereon.

(2) to any purchase of standing timber for an amount not exceeding in the aggregate for any one purchaser in respect of any period of three months the sum of £300.

2. All persons engaged in the purchase or sale of standing timber shall furnish such particulars as to their business as may be required from time to time by or on behalf of the Controller of Timber Supplies.

The Home Grown Timber Prices (Great Britain) Order, 1917.

AN Order, dated 4th July, 1917, was made by the War Office, to the effect that:—1. From the date hereof until further notice no person shall, without a permit issued by or on behalf of the Controller of Timber Supplies, sell any timber grown in Great Britain of the descriptions set out in the Schedule hereto annexed at prices exceeding the prices set out in the said Schedule, or such other prices as in any particular case may be allowed by or on behalf of the Controller of Timber Supplies.

2. All persons engaged in the purchase or sale of converted timber, including pitwood, grown in Great Britain, shall furnish such particulars as to their business as may be required from time to time by or on behalf of the Controller of Timber Supplies.

SCHEDULE.

	Spruce or Scots Fir. Per cubic foot.		*Larch.* Per cubic foot.	
	s.	*d.*	*s.*	*d.*
Deals and Battens, in sizes of 2 in. by 2 in. to 4 in. by 9 in., averaging 11 ft. long... ..	3	0	3	6
Boards, averaging 7 in. wide. Thicknesses, under ½ in. ..	4	0	4	6
„ ½ in. to 1 in. inclusive ..	3	6	4	0
„ over 1 in. to 1½ in. inclusive ..	3	3	3	9
Timber, over 4 in. thick, averaging 11 ft. long .. .. *Planking*, 9 in. wide, averaging 11 ft. long	3	9	4	4

Sleepers, (either Spruce, Scots Fir, or Larch), 9 ft. long by 10 in. by 5 in.—

	s.	*d.*
8 in. face at	7	6 each.
7 „	7	0 „
5 „	6	3 „

The above prices are for timber delivered free on rail at loading station and are subject to customary discount for payment in one month.

Cheap Railway Fares for Women Workers in Agriculture.

THE following Notice was issued on 5th July, 1917:—The Board of Agriculture and the Ministry of Labour (Employment Department) have arranged with the Railway Executive Committee that cheap return fares at the rate of a single fare and a quarter for the return journey, without the 50 per cent. addition, or at half that rate for a single journey, will be available for all women seasonal workers in agriculture who have *bonâ fide* engagements with farmers and fruit growers. The new arrangement is already in operation.

The cheap tickets which have up till now been available in certain districts at railway booking offices will be discontinued after the 14th instant, and women workers will then only be able to obtain a reduced fare by means of a railway warrant issued on behalf of the Board of Agriculture or the Employment Department on payment of the reduced fare.

These warrants will not, in any circumstances, be issued by the Board of Agriculture direct to the women, therefore all applications from women who have not been recruited by the Employment Exchanges or the National Service Department must be made to the Women's National Land Corps, 50, Upper Baker Street, London, W., or to any other society recognised by the Board for placing women in agriculture.

Voluntary societies desiring these facilities should apply to the Board of Agriculture for warrants under conditions laid down by the Board. These facilities will not be limited to parties of over eight as has hitherto been the case.

Women who have secured employment on the land through the Employment Exchanges will, as heretofore, obtain their railway warrants from local Employment Exchanges.

Soldier Labour.

THE following Memorandum, dated 10th July, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees in England and Wales:—

The Military Authorities have issued instructions that no soldiers who are now engaged on agricultural work are to be withdrawn from the land until further notice. This instruction applies to all classes of soldiers who have been made available for agricultural work.

The soldiers due to return to their units on the 25th instant may, therefore, remain on the farms where they are at present employed until such time as your Committee find it necessary to make use of their services elsewhere.

The 1917 Crop (Restriction) Order, 1917.

AN Order, dated 13th July, 1917, has been made by the Food Controller to the effect that:—

1. No person shall, without a permit issued under the authority of the Food Controller, either on his own behalf or on behalf of any other person,

(*a*) buy, sell or deal in; or

(*b*) offer, or invite an offer, or propose to buy or sell or deal in; or

(*c*) enter into negotiations for the sale or purchase of or other dealing in

any wheat, barley, oats or rye of the 1917 crop grown in the United Kingdom, or any potatoes of the 1917 crop, grown in the United Kingdom other than first and second earlies.

2. Except in such cases as the Food Controller shall otherwise determine, and except also in the case of any contracts made by, or under the authority of, any Government Department, all contracts for the sale or disposition of any part of the crops referred to in Clause 1 hereof are cancelled

3. Infringements of this Order are summary offences against the Defence of the Realm Regulations

Correction.

IN the June issue of this *Journal*, p. 282, a reference was made in a footnote to the *Journal of the Royal Agricultural Society*. The reference should read "*Journal of the Royal Horticultural Society*, 1901–02, p. 832."

Leaflets in 1917.

SINCE the date of the list given on p. 1024 of the *Journal* for January, 1917, the following Leaflet has been issued in the ordinary series:—

No 308—*Plum Aphides*

In addition, the information in the following Leaflets has been revised and brought up to date.—

No. 1—*Black Currant Gall Mite*. This Leaflet has been entirely re-written.
No. 10—*Wireworms*.
No. 23—*Potato Disease*. This Leaflet has been entirely re-written
No. 31—*Onion Fly*
No. 105.—*Wart Disease of Potatoes*.
No. 111—*Increasing Profits from Eggs*.
No. 127.—*The Stalk (Sclerotinia) Disease of Potatoes and Related Sclerotinia Diseases*. This Leaflet has been entirely re-written.
No. 132.—*Slugs and Snails*.
No. 137.—*Potato Scab* This Leaflet has been entirely re-written.
No. 173.—*Potato Growing*.
No. 197.—*Agricultural Education in England and Wales*.
No. 234.—*Botrytis Diseases*.
No. 264.—*Cultivation of Onions*.
No. 273.—"*White Heads,*" *or* "*Take All*" *of Wheat*.
No. 296.—*Potato Growing in Allotments and Small Gardens*.
No. 298.—*Pig-Keeping for Cottagers and Small Holders*.

The following Special Leaflets have been issued since the date of the last list :—

Special Leaflet No. 67.—*Economy in Using Potatoes.*
„ „ No. 68.—*Hints on Purchasing "Seed" Potatoes.*
„ „ No. 69.—*The Culture of Early Potatoes under Glass.*
„ „ No. 70.—*The Cultivation of Parsnips.*
„ „ No 72 —*Short Term Credit for Farmers.*
„ „ No. 74.—*Cutting of Seed Potatoes.*
„ „ No. 75.—*The Manufacture of Cheese in Co-operative Dairies.*
„ „ No. 76.—*Feeding Stuffs and Live Stock.*
„ „ No. 77.—*Hay-making Machinery.*

The following Special Leaflets have been revised and brought up to date :—

Special Leaflet No. 3.—*Poultry on Allotments and Garden Plots.*
„ „ No. 20.—*Coconut Cake and Palm Kernel Cake.* This Leaflet has been entirely re-written.
„ „ No. 26.—*Suggestions to Allotment Holders for General Cropping during the Spring and Summer Months.*
„ „ No. 37.—*Economy in Food: Appeal to Country People.*
„ „ No. 45.—*Calf Rearing.*
„ „ No. 49.—*The Selection of Wheats for Spring Sowing.*
„ „ No. 56.—*The Manuring of Cottage Gardens and Allotments.*
„ „ No. 68.—*Hints on Purchasing "Seed" Potatoes.*

The following unnumbered Leaflets have also been issued :—

Notice to Poultry Keepers respecting the Feeding of Poultry.
Organisation and Establishment of Co-operative Cheese Factories

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad

The *International Crop Report and Agricultural Statistics* for June, 1917, published by the International Institute of Agriculture, contains figures of the estimated production of the cereal crops of 1917 in a few countries in the Northern Hemisphere.

Wheat—The production in France, United States, India and Japan is estimated at 152,899,000 qr., against 150,062,000 qr. last year, the increase amounting to 1·9 per cent.

Rye.—The estimated production in the United States in 1917 is placed at 6,753,000 qr., or an advance of 22·2 per cent. on the previous year, when the production was 5,526,000 qr.

Barley.—The production in the United States is estimated at 25,672,000 qr., against 21,705,000 qr. in 1916, or an advance of 18·3 per cent.

Oats.—It is estimated that the production in the United States will amount to 148,666,000 qr., as compared with 128,374,000 qr. last year, the advance equalling 10·3 per cent.

The condition of the crops in other countries (100 being taken to represent the average yield during the past 10 years) is given as follows : *Wheat*: Ireland 95, Switzerland 96, Canada 92; *rye*: Ireland and

Norway 100, Switzerland 96, Canada 97; *barley*. Ireland 100, Switzerland 99, Canada 95; *oats*: Ireland 95, Switzerland 100, Canada 91.

Uruguay.—The final estimate of the crops of 1916–17 places the production of wheat at 674,000 qr, against 1,233,000 qr. in the previous year, or a reduction of 45 4 per cent.

Russia—A Press Association message, dated 26th June, states that, according to information received by the Russian Government from 487 districts, the yield of winter wheat promises to be below average in 77 districts: average in 48, bad in 29; satisfactory in 221, and good in 57. The condition of spring wheat is slightly below normal, growth having been hindered by the cold weather early in May. (*Broomhall's Corn Trade News*, 27th June)

Canada—According to a report, dated 22nd June, received from the High Commissioner for Canada, the Census and Statistics Office at Ottawa estimate the area sown with wheat this year at 13,450,250 acres, or 4 per cent. greater than the area harvested in 1916. In a later report, dated 29th June, it is stated that the condition of crops in the three prairie provinces is considered good.

United States.—According to a report issued by the Statistical Bureau of the Department of Agriculture the condition of the crops on the 1st July was as follows (1916 figures in brackets for comparison): winter wheat, 75 9 (75 7), spring wheat, 83 6 (89 0); barley, 85·4 (87 9), oats, 89·4 (86 3), winter rye, 79 4 (87 0), maize, 81 1 (82·0). The yield of winter wheat is now estimated at 402,000,000 bush. as compared with 482,000,000 bush last year, spring wheat, 276,000,000 bush. against 158,000,000 bush, barley, 214,000,000 bush. against 181 000,000 bush., oats 1,453 000 000 bush against 1,252,000,000 bush.; and rye 56,000,000 bush. against 47,000,000 bush. in 1916. The area under maize is estimated at 121,000,000 acres as compared with 108,620,900 acres last year, and the yield at 3,124,176,000 bush. against 2,583,000,000 bush. last year. The condition of hay on 1st July was 84·3, and the yield is estimated at 103 000,000 tons. The amount of old wheat in farmers' hands is estimated at 15,720,000 bush. compared with 73,760,000 bush a year ago. (*Broomhall's Corn Trade News*, 10th July.)

Agricultural Conditions in England and Wales on 1st July.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st July, state that the warm weather and rains have improved the prospects of most of the crops. Wheat has improved and has grown well, but there are in nearly all districts some thin and patchy pieces, especially on the light soils which suffered from drought. The yield is not expected to come up to the average. Barley is promising, and is likely to be the best of the cereal crops, though not quite reaching the average. Oats are not so satisfactory, except in the north and north-west of England, where over-average yields are anticipated, but the general result is for a crop below the normal. Straw is generally short for all cereals. Beans and peas have not done well, and both crops will be below the average.

Potatoes have made a strong and healthy growth, and are generally free from disease. An over-average crop is expected in all districts.

Turnips and swedes have suffered from the dry weather of the early part of the month, fly has been very troublesome, and much has had to be re-sown. Mangolds have done better and are now looking well, and a yield slightly over the average is anticipated.

The hay harvest is backward, and little progress has yet been made in many districts owing to unfavourable weather conditions. The cutting of seeds' hay is more forward than that of the meadow hay, and the yield of both classes is expected to be less than usual.

Towards the middle of the month pastures began to look bare, but the later rains have effected an improvement. Live stock have done well, and are generally in good condition.

The weather has been favourable for the growth of hops, and the bine has made a strong and healthy growth. Very little fly is mentioned, and washing has been less than usual. An over-average yield is expected in Kent, and an average in the western counties.

The prospects for the fruit crops, especially of orchards, are not so favourable as a month ago owing to attacks by caterpillars, although over-average crops of apples, plums, pears and cherries are still anticipated. Raspberries, currants and gooseberries also promise large crops.

Labour is everywhere deficient, but the shortage has to some extent been met by the employment of women and of soldiers in those districts where they have not been withdrawn.

Summarizing the returns, and expressing an average crop by 100, the condition of the crops on the 1st July indicated probable yields per acre which may be denoted by the following percentages: Wheat, 94; barley, 98; oats, 93; beans, 88; peas, 94; potatoes, 103; mangolds, 101; seeds' hay, 97; meadow hay, 95; hops, 102.

The following local summaries give further details regarding agricultural labour in the different districts of England and Wales.

Agricultural Labour in England and Wales during June.

Northumberland, Durham, Cumberland and Westmorland.—The supply of labour is scarce, although women, and in some districts soldiers, have relieved the situation considerably.

Lancashire and Cheshire.—The supply of labour is generally deficient. In some districts Irish haymakers are numerous, but are asking for increased wages. The lateness of the hay harvest has somewhat mitigated the shortage.

Yorkshire.—The supply of labour is barely sufficient to enable farmers to carry on their work. The outlook is not good for the hay harvest, and few Irishmen have as yet arrived.

Shropshire and Stafford.—The shortage is still keenly felt, but is somewhat modified by the assistance rendered by women and soldiers throughout the district.

Derby, Nottingham, Leicester, and Rutland.—All districts report a grave shortage, which is only partly relieved by the assistance of women and soldiers.

Lincoln and Norfolk.—Labour is still very deficient, but assistance for hoeing and haymaking has been received from women and soldiers in some districts.

Suffolk, Cambridge, and Huntingdon.—The supply of labour is very deficient, but women are being largely employed, and the employment of soldiers is also reported from some districts.

Bedford, Northampton, and Warwick.—Labour, especially skilled, is deficient, but great assistance is being rendered by women and soldiers for hoeing and haymaking. Wages are still rising.

Buckingham, Oxford, and Berkshire.—Labour generally is very deficient; the shortage is being met in some districts by the employment of women and soldiers, but in others this help is unobtainable.

Worcester, Hereford, and Gloucester.—Labour is still very scarce, but to some extent the shortage has been made good by the employment of women and soldiers.

Cornwall, Devon, and Somerset.—The scarcity is still keenly felt for both regular and casual work, in spite of the high wages offered. Women and soldiers have, to a large extent, made this deficiency less acute.

Dorset, Wiltshire, and Hampshire.—Labour is generally short, but with the assistance of soldiers and women the work has been kept in hand.

Surrey, Kent, and Sussex.—The supply is mostly inadequate, especially for hoeing, but much help is being given by women.

Essex, Hertford, and Middlesex.—Labour is very short, but is somewhat relieved by the assistance given by soldiers and women; it will still prove short during harvest time.

North Wales.—Labour is still scarce, although wages offered are very good. The shortage of both regular and casual labour will be especially felt during the harvest, but women and soldiers are assisting very largely.

Mid Wales.—In some districts labour is extremely scarce, but farmers anticipate more help from soldiers for the hay and corn harvest, and in some instances women are being employed.

South Wales.—Labour is very scarce throughout the division.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st July, 1917, certain diseases of animals existed in the countries specified:—

Austria (on the 30th May).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of April).—Anthrax, Foot-and-Mouth Disease, Swine Erysipelas, Swine Fever.

France (for the period 20th May—2nd June).—Anthrax, Blackleg, Foot-and-Mouth Disease, Glanders and Farcy, Rabies, Swine Erysipelas, Swine Fever.

Germany (for the period 15th—31st May).—Foot-and-Mouth Disease, Glanders and Farcy, Pleuro-pneumonia, Swine Fever.

Holland (month of May).—Anthrax, Foot-and-Mouth Disease, Foot-rot, Swine Erysipelas.

Hungary (on the 30th May).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (for the period 21st—27th May).—Anthrax, Black-leg, Foot-and-Mouth Disease (449 outbreaks), Glanders and Farcy, Rabies, Sheep-scab, Swine Fever.

Norway (month of April).—Swine Fever.

Sweden (*month of April*).—Anthrax, Swine Fever.

Switzerland (*for the period 4th—10th June*).—Anthrax, Blackleg, Swine Fever.

No further returns have been received in respect of the following countries: Belgium, Bulgaria, Montenegro, Rumania, Russia, 'Serbia, Spain.

The Weather in England during June.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 2nd June:								
England, N.E.	56·3	+3·4	0·17	4	— 7	2	8·4	+2·1
England, E.	59·7	+4·6	0·07	2	— 8	1	9·9	+2·7
Midland Counties	57·7	+3·0	0·80	20	+ 8	3	6·4	0·0
England, S.E.	58·2	+2·5	0·49	13	+ 3	2	7·7	+0·3
England, N.W.	55·5	+1·6	0·96	24	+10	4	5·7	—1·0
England, S.W.	55·2	+0·3	1·02	26	+15	4	4·8	—2·1
English Channel	55·0	— 0·9	0·51	13	+ 1	3	6·4	—1·7
Week ending 9th June:								
England, N.E.	56·4	+2·7	0·18	5	— 6	2	7·5	+1·4
England, E.	59·9	+3·9	0·05	1	—12	1	9·9	+3 2
Midland Counties	57·9	+1·9	0·35	9	— 5	2	7 8	+1·7
England, S.E.	59·7	+2·8	0·16	4	—10	1	10·8	+3·9
England, N.W.	56·1	+1·0	0·60	15	+ 5	3	7·5	+0·7
England, S.W.	57·0	+0·9	0·34	9	— 5	3	8·7	+1·9
English Channel	59·9	+3·0	0·22	6	— 7	2	10·3	+3·0
Week ending 16th June:								
England, N.E.	59·5	+5·2	0·14	4	— 6	1	10·3	+3·9
England, E.	63·1	+7·3	0·18	5	— 7	1	10·5	+3·7
Midland Counties	62·4	+6·6	0·12	3	— 7	1	10·6	+4·2
England, S.E.	62·9	+6·3	0·33	8	— 2	1	9·9	+2·8
England, N.W.	60·9	+5·4	0·04	1	—11	1	9·9	+2·8
England, S.W.	60·6	+4·5	0·06	2	—12	1	9·9	+2·7
English Channel	61·8	+4·8	0·00	0	— 8	0	9·6	+1·4
Week ending 23rd June:								
England, N E.	58·6	+2·5	0·51	13	— 1	4	6·1	+0.2
England, E.	62·4	+4·5	0·51	13	+ 2	4	7·2	+0·5
Midland Counties	59·5	+2·1	0·54	14	0	4	5·4	—0·4
England, S.E.	61·3	+3·0	0·52	13	+ 2	3	6·8	—0·1
England, N.W.	55·9	+0·5	1·29	33	+15	4	6·0	+0·3
England, S.W.	58·2	+1·2	0·70	18	+ 4	5	6·3	+0·2
English Channel	60·6	+2·3	0·87	22	+10	4	9·3	+1·9
Week ending 30th June:								
England, N.E.	53·4	—4·3	0 44	11	— 1	3	5·6	—0·8
England, E	57·5	—2·1	1·08	28	+17	5	3·3	—4·0
Midland Counties	54·6	—4·5	0·98	25	+11	4	3·8	—2·7
England, S.E.	57·9	—2·1	1·58	40	+30	4	3·9	—3·9
England, N.W.	53·7	—4·1	0·23	6	—11	2	7·9	+1·6
England, S.W.	55·0	—3·4	1·63	42	+27	4	5·2	—1·8
English Channel	57·7	—1·8	1.00	25	+16	5	5·6	—3·0

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	JUNE.		SIX MONTHS ENDED JUNE.	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	25	43	293	318
Animals attacked	31	56	336	376
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	24
Glanders (including Farcy):—				
Outbreaks...	4	6	15	27
Animals attacked	6	9	27	71
Parasitic Mange:—				
Outbreaks	216	144	1 590	1,476
Animals attacked . ..	363	349	3,187	3,452
Sheep-Scab.—				
Outbreaks	15	5	383	177
Swine Fever:—				
Outbreaks	284	568	1,412	2,615
Swine slaughtered as diseased or exposed to infection	138	1,659	609	8,085

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	JUNE.		SIX MONTHS ENDED JUNE.	
	1917	1916.	1917.	1916.
Anthrax:—				
Outbreaks	1	—	3	2
Animals attacked	3	—	5	6
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	—
Parasitic Mange:—				
Outbreaks	5	8	28	37
Sheep-Scab:—				
Outbreaks	23	14	233	226
Swine Fever:—				
Outbreaks	17	36	141	159
Swine slaughtered as diseased or exposed to infection	76	228	930	884

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in June and May, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	June. First Quality.	June. Second Quality.	May. First Quality.	May. Second Quality.
FAT STOCK :—	per stone.*	per stone.*	per stone.*	per stone.*
Cattle :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Polled Scots	20 5	18 3	17 11	16 11
Herefords	19 6	17 10	17 2	15 11
Shorthorns	19 2	17 9	17 5	16 2
Devons	18 6	16 11	17 3	15 6
Welsh Runts	—	—	—	16 4
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	17¼	15¼	16¼	14
Sheep :—				
Downs	18¼	16¾	17¾	16½
Longwools	17	15¼	16¼	15¼
Cheviots	19	17½	19	17¼
Blackfaced	17¼	16½	18¾	17½
Welsh	16¼	15½	17	15¾
Cross-breds	18¼	16½	18	16½
	per stone.*	per stone.*	per stone.*	per stone.*
Pigs :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Bacon Pigs	16 0	15 1	16 0	15 0
Porkers	16 7	15 9	16 5	15 6
LEAN STOCK :—	per head.	per head.	per head.	per head
Milking Cows :—	£ *s.*	£ *s.*	£ *s.*	£ *s.*
Shorthorns—In Milk ..	44 10	35 5	42 16	34 7
,, —Calvers ...	41 8	33 5	40 16	32 16
Other Breeds—In Milk ...	43 19	33 8	39 9	31 13
,, —Calvers ...	28 10	26 10	28 0	25 10
Calves for Rearing	4 4	3 5	3 16	2 18
Store Cattle :—				
Shorthorns—Yearlings ...	17 19	15 15	16 16	15 0
,, —Two-year-olds..	26 17	23 0	27 0	22 18
,, —Three-year-olds	36 3	30 13	35 8	29 19
Herefords —Two-year-olds...	28 12	24 8	28 8	22 12
Devons— ,,	28 13	24 7	29 1	24 9
Welsh Runts— ,,	27 11	22 4	26 9	21 15
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Downs or Longwools ...	70 9	62 4	80 11	68 8
Store Pigs :—				
8 to 12 weeks old	36 9	27 9	35 1	26 8
12 to 16 ,, ,, ...	60 11	47 11	57 5	45 2

* Estimated carcass weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in June, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	Quality.	Birmingham.		Leeds.		Liverpool.		London.		Manchester.	
		per cwt.		per cwt.		per cwt.		per cwt		per cwt.	
		s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
BEEF :—											
English	1st	139	0	136	0	—		141	6	144	0
	2nd	134	0	128	6	—		134	6	139	6
Cow and Bull	1st	126	0	127	6	123	6	114	6	128	6
	2nd	116	6	117	0	99	0	106	0	119	0
Irish: Port Killed	1st	140	0	—		143	6	140	0	141	6
	2nd	133	0	—		130	6	132	0	135	6
Argentine Frozen—											
Hind Quarters	1st	—		—		—		—		—	
Fore ,, ...	1st	—		—		—		—		—	
Argentine Chilled—											
Hind Quarters	1st	126	6	126	0	122	0	128	6	122	0
Fore ,, ...	1st	102	0	99	6	99	6	100	6	99	6
American Chilled—											
Hind Quarters	1st	—		—		—		132	0	—	
Fore ,, ...	1st	—		—		—		103	0	—	
VEAL :—											
British	1st	139	0	147	0	140	0	140	0	133	0
	2nd	130	6	116	6	108	6	121	6	107	6
Foreign	1st	—		—		—		—		—	
MUTTON :—											
Scotch	1st	—		169	0	158	6	172	6	160	0
	2nd	-		157	6	137	6	163	6	151	6
English	1st	157	6	169	0	-		165	6	151	6
	2nd	148	0	157	6	—		156	6	143	6
Irish: Port Killed	1st	154	0	—		144	6	157	0	152	6
	2nd	—		—		130	6	148	0	134	0
Argentine Frozen	1st	95	6	95	6	95	6	93	6	95	6
New Zealand ,, ...	1st	86	6	—		86	6	87	6	86	6
Australian ,, ...	1st	—		—		—		—		—	
LAMB :—											
British	1st	169	0	179	6	168	0	176	0	164	6
	2nd	158	6	168	0	149	6	163	6	155	0
New Zealand	1st	100	6	—		98	0	98	0	98	0
Australian	1st	100	6	100	6	98	0	98	0	98	0
Argentine	1st	105	0	105	0	105	0	102	6	105	0
PORK :—											
British	1st	133	0	131	0	—		121	6	—	
	2nd	128	6	121	6	—		111	0	—	
Frozen	1st	103	6	103	0	88	6	102	6	93	6

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in June, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	22 0	21 0
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	195 0	191 0	191 0	187 0	192 0	188 0
,, Factory	181 0	176 0	174 6	170 0	179 6	173 6
Danish	—	—	210 6	207 0	202 6	199 0
French	—	—	—	—	203 0	194 6
Dutch	—	—	—	—	191 0	181 0
American	—	—	—	—	—	—
Australian	191 0	187 0	187 6	183 6	189 0	185 0
New Zealand	198 6	196 6	196 6	194 6	193 0	189 0
Argentine	—	—	—	—	186 6	182 6
CHEESE :—						
British—						
Cheddar	165 0	162 0	—	—	148 0	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	158 0	151 0	158 0	—
			per cwt	per cwt.	per cwt.	per cwt.
Canadian	162 0	160 0	—	—	162 0	160 0
BACON :—						
Irish (Green)	147 0	145 0	150 6	145 0	147 0	140 0
Canadian (Green sides)	128 6	126 6	126 0	122 6	124 6	120 6
HAMS :—						
York (Dried or Smoked)	—	—	—	—	190 0	180 0
Irish (Dried or Smoked)	—	—	—	—	155 0	150 6
American (Green) (long cut)	130 0	127 0	127 0	124 6	127 6	124 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	21 5	19 9
Irish	19 3	—	18 10	17 9	19 7	18 6
Danish	—	—	—	—	20 10	18 6
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	—	—	—	—	—	—
Edward VII.	—	—	—	—	—	—
Evergood	—	—	—	—	—	—
HAY :—						
Clover	—	—	150 0	—	139 0	129 6
Meadow	—	—	—	—	139 0	129 6

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882. in each Week in 1915, 1916 and 1917.

Weeks ended (in 1917).		WHEAT.						BARLEY.						OATS.					
		1915.		1916.		1917.		1915		1916		1917		1915.		1916		1917.	
		s.	d.	s.	d.	s.	d.	s	d	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan.	6 ...	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
,,	13 ...	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
,,	20 ...	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
,,	27 ...	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb	3 ...	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
,,	10 ...	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
,,	17 ..	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
,,	24 ...	56	0	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar.	3 ...	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
,,	10 ...	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
,,	17 ...	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
,,	24 ...	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
,,	31 ...	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl.	7 ...	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
,,	14 ...	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
,,	21 ..	56	5	55	3	84	10	31	5	52	10	70	6	30	11	31	8	59	8
,,	28 ...	58	3	56	3	81	1	32	7	53	5	69	5	31	5	32	4	58	6
May	5 .	60	5	55	7	77	7	33	3	53	1	64	4	32	4	32	10	54	9
,,	12 ..	61	7	55	5	78	0	34	0	53	5	64	11	32	5	33	1	55	2
,,	19 ...	62	0	55	0	77	11	34	1	52	10	64	10	32	8	33	0	55	2
,,	26 ...	61	11	54	7	78	0	34	8	52	9	64	9	32	7	33	4	54	11
June	2 ..	61	9	53	3	78	0	35	4	53	9	65	11	32	5	33	3	54	11
,,	9 ...	60	1	51	2	78	0	34	5	52	8	67	7	32	4	32	7	55	0
,,	16 ...	56	1	48	10	78	2	34	3	50	9	75	6	31	9	32	1	55	1
,,	23 ...	52	0	47	6	78	1	34	4	49	10	75	0	31	9	31	3	55	2
,,	30 ...	49	5	46	3	78	3	35	3	49	1	73	11	31	1	30	10	55	1
July	7 ...	50	1	46	3	78	1	34	7	45	6	69	5	31	6	30	8	55	2
,,	14 ...	52	7	48	11			35	8	47	5			31	6	31	6		
,,	21 .	53	10	51	6			35	10	48	8			32	1	32	3		
,,	28 ...	55	3	53	5			36	1	47	2			31	1	32	5		
Aug	4 ...	55	4	55	1			35	7	46	1			31	5	32	9		
,,	11 ...	55	2	56	7			37	0	46	11			31	7	31	2		
,,	18 ..	54	3	58	1			39	4	48	0			31	4	30	8		
,,	25 ..	51	11	59	0			38	3	47	1			30	0	31	6		
Sept	1 ..	45	3	59	4			38	1	48	5			26	10	30	5		
,,	8 ...	43	0	59	3			37	11	51	7			26	8	31	1		
,,	15 ...	42	9	59	11			39	0	52	6			26	4	30	9		
,,	22 ...	43	3	59	4			39	8	53	3			26	1	30	9		
,,	20 ...	43	5	58	10			40	4	54	1			26	5	31	1		
Oct	6 ..	44	1	59	2			41	0	54	5			26	5	30	9		
,,	13 ...	45	9	59	7			42	3	53	10			27	1	31	6		
,,	20 ..	48	2	60	9			44	0	53	8			28	1	31	11		
,,	27 ..	50	3	62	10			46	2	54	6			29	1	32	10		
Nov.	3 ...	51	6	66	7			47	3	56	2			30	4	34	0		
,,	10 ...	52	8	69	8			47	5	58	0			30	11	35	8		
,,	17 ..	53	6	70	9			47	11	59	8			31	3	37	8		
,,	24 ...	54	2	70	8			48	7	61	8			31	1	39	7		
Dec	1 ...	53	7	71	3			48	11	63	1			30	11	41	4		
,,	8 ...	52	10	72	1			47	10	65	6			30	4	44	1		
,,	15 ...	53	11	73	2			47	5	66	5			30	6	45	10		
,,	22 ...	53	10	74	8			47	2	67	3			30	7	46	5		
,,	29 ...	54	9	75	10			47	5	67	5			30	10	47	4		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb per Imperial Bushel.

AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of June, 1915, 1916. and 1917.

—	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
London ...	58	5	50	0	79	9	35	1	51	0	66	2	33	5	33	5	55	4
Norwich ...	58	5	49	6	77	11	33	4	48	10	65	2	31	9	31	4	55	2
Peterborough	54	8	47	9	78	1	33	3	48	8	65	1	31	8	31	8	55	1
Lincoln ..	56	2	50	3	77	8	33	8	49	9	68	0	31	4	32	4	54	8
Doncaster ...	54	4	50	1	77	11	...		...		.		31	3	31	7	54	11
Salisbury ...	57	4	49	4	78	2	34	8	50	1	65	8	31	8	31	6	55	1

Statement showing the Average Price of BRITISH CORN, per Quarter (Imperial Measure), for the Quarter ending Midsummer, 1917, pursuant to the Corn Returns Act. 1882.

Wheat.			*Barley.*			*Oats.*	
s.	*d.*		*s.*	*d.*		*s.*	*d.*
79	9	..	69	1	..	55	9

ADDITIONS TO THE LIBRARY.

Agriculture, General and Miscellaneous—

Cooley, E. G.—Vocational Education in Europe. 2 Vols. (347 + 177 pp.) Chicago: The Commercial Club of Chicago, 1912, 1915. [37(02); 371.]

Orr, J.—Agriculture in Oxfordshire. (239 pp.) Oxford: Clarendon Press, 1916. 8*s.* 6*d* net. [63(42).]

Castle, W. E.—Genetics and Eugenics. A Text Book for Students of Biology and a Reference Book for Animal and Plant Breeders. (353 pp.) Cambridge (Mass.): Harvard University Press; London: Humphrey Milford, Oxford University Press, 1916. $2.00 [575 1.]

Kraemer, H.—Applied and Economic Botany. (822 pp. + 424 Plates.) Philadelphia: published by the Author, 1916. [58.11.]

Savage, G.—Les Deux Agricultures: France et Allemagne. (244 pp.) Paris: 9 rue Caroline; sold by the Author, 1916. [63(43); 63(44).]

Falconer, J.—The Ploughing up of Grass Land and its Subsequent Treatment. (63 pp.) [Journal of the Farmers' Club, March, 1917.] London: Farmers' Club. 6*d.* [63.196.]

Porter, J.—A Big Stride in Agricultural Improvement. (32 pp.) Hereford, 1916. 6*d.* net. [63.3(04).]

Horticulture—

Scarlett, J. W.—Suggestions for Modifying the Cost of Fruit and Vegetable Distribution. (16 pp.) London: "The Fruitgrower," 1916. 3*d.* [63.41-198.]

Harriman, Miss G.—Market Gardening for Ladies. (54 pp.) Derby: F. Carter, 1916. 1*s.* 6*d.* [63.51(02).]

May Byron's Jam Book. (276 pp.) London: Hodder & Stoughton, 1916. 2*s.* 6*d.* net. [664.85.]

Armstrong College.—College Bull. 14:—The Sowing Down of a Garden Lawn at Armstrong College. (4 pp.) Newcastle-upon-Tyne, 1916. [63.52.]

The Sterilization of Fruit and Vegetables for the Home. (22 pp.) London: Central Committee for National Patriotic Organisations [1916]. 1*d.* [664.8.]

The Sterilization of Fruit and Vegetables for the Market. (15 pp.) London: Central Committee for National Patriotic Organisations [1916]. 1*d.* [664.8.]

Zavalla, J. P.—The Canning of Fruits and Vegetables. (214 pp.) London: Chapman & Hall, 1916. 10*s.* 6*d.* [664.8.]

Sutton and Sons.—The Culture of Profitable Vegetables in Small Gardens. (40 pp.). London: Simpkin, Marshall, Hamilton, Kent & Co., 1917. 6*d.* net. [63.51(04).]

Davidson, H. C.—Rational Fruit Culture. (127 pp.) London: "Garden Life" Press, 1917. 2*s.* 6*d.* net. [63.41(02).]

Cowley, H.—Vegetable-Growing in War-Time. (30 pp.) London: "Country Life" Offices, and G. Newnes, Ltd., 1917. 6*d.* net. [63.51(04).]

Green, F. E.—Everyman's Land and Allotment Book. (192 pp.) London: "The Daily Chronicle, 1917. 7*d.* net. [63(022).]

Gentle, A G.—Practical Potato-Growing and Storing. (32 pp.) Little Gaddesden: published by the Author, 1917. 1*s.* post free. [63.512(04).]

Wright, W. P.—Food, Fruit, and Flowers. (336 pp.) London: J. M. Dent & Sons, 1917. 5*s.* net. [63.5(02).]

Newsham, J. C.—The Potato Book. (92 pp.) London: C. A. Pearson, 1917. 1*s.* net. [63.612(02).]

Brett, W.—The Allotment Book. How to Make the Most of your Land. (92 pp.) London: C. A. Pearson, 1917. 1*s.* net. [63.51(02).]

Thomas, H. H.—Gardening: A Complete Guide. (152 pp.) Cassell & Co., 1917. 1*s.* 3*d.* net. [63.5(02).]

Spence, Major D. A.—Potatoes. (23 pp.) [Journal of the Farmers' Club, January, 1917.] London: Farmers' Club. 6*d.* [63.512(04).]

Cambridge University School of Agriculture.—Potato-Growing, Preparation of the Ground by "Sheep Folding." (4 pp.) Cambridge, 1917. [63.512(04).]

Field Crops—

Carleton, M. A.—The Small Grains. (699 pp.) New York: The Macmillan Company, 1916. 7*s.* 6*d.* [63.31(02).]

Ellis, Mrs. J. D.—Herbs used in Medicine (First Series), with Descriptive and Explanatory Notes. (32 pp. + 16 Plates.) London: National Herb-growing Association, 1917. 3*s.* net. [63.348.]

West of Scotland Agricultural College.—Bull. 78. Notes on Medicinal Plants. (100—149 pp.) Glasgow, 1917. [63.348.]

Bangor, University College of North Wales, Department of Agriculture.—The Improvement of Rough Pastures. (7 pp.) [1917.] [63.33-16.] The Formation of Pastures. (4 pp.) [1917.] [63.33(*b*).]

Plant Diseases—

McAlpine, D.—Bitter Pit Investigation: The Control of Bitter Pit in the Growing Fruit. Third Progress Report, 1913-14. (176 pp. + XXXVII. Plates.) The Experimental Results in their Relation to Bitter Pit and a General Summary of the Investigation. Fourth Report, 1914-15. (178 pp. + XL. Plates.) Melbourne: Government Printer. [63.21.]

Rome, Institut International d'Agriculture.—La Lutte contre les Sauterelles dans les divers Pays. (186 pp.) Rome, 1916. Fr. 3.00. [63.27.]

Shipley, A. E.—Studies in Insect Life and other Essays. (338 pp.) London: T. Fisher Unwin, 1917. 10*s.* 6*d.* net. [59.57.]

Eastern Counties Province.—Leaflet 2.—Finger-and-Toe. (3 pp.) Cambridge, 1917. [63.24.]

Live Stock—

Jones, C. Bryner (edit.).—Live Stock of the Farm. Vol. VI. Bees, Goats, Dogs, Ferrets, Asses and Mules. (199 pp.) London: Gresham Publishing Company, 1916. 42*s.* net the 6 vols. [63.6(03).]

Leeds University, Agricultural Dept.—Bull. 73:—Composition, Nutritive and Manurial Values of Farm Foods. [3rd revision.] Leeds, 1916. [63.604(*a*).]

U.S. Department of Agriculture.—Farmers' Bull. 720:—Prevention of Losses of Live Stock from Plant Poisoning. (11 pp.) Washington, 1916. [619(04); 63.25.]

Live Stock—

U.S. Department of Agriculture, Office of the Secretary.—Report No. 112:—Meat Situation in the United States. Part IV., Utilization and Efficiency of Available American Feed Stuffs. (27 pp.) Washington, 1916. [63.604(*a*).]

Massé, A.—Le Troupeau Français et la Guerre: Viande Indigène—Viande Importée. (382 pp.) Paris: Librairie Agricole de la Maison Rustique, 1915. 3 *fr.* 50. [63.6(44).]

Bull, S.—The Principles of Feeding Farm Animals. (397 pp.) New York: The Macmillan Company, 1916. 7*s.* 6*d.* net. [63.604.]

Deutsche Landwirtschafts-Gesellschaft.—Arbeiten. Heft 270:—Die Bedeutung des Schweines fur die Fleischversorgung. (381 pp. + 32 Plates.) Berlin: Paul Parey, 1914. 10 M. [63.64(02).]

Northumberland County Council, Agricultural Experiment Station, Cockle Park. Bull. 25:—Palm Kernel Cake, Palm Kernel Meal, and Cocoanut Cake, compared with Soya Cake, for Fattening Cattle, young Store Cattle, and Fattening Sheep, 1915-16. (8 pp.) Newcastle-on-Tyne, 1916. [63.62; 63.33.]

Dairying and Food, General—

Murray, J. Alan.—The Economy of Food: A Popular Treatise on Nutrition, Food and Diet. (253 pp.) London: Constable & Co., 1916. 2*s.* net. [612.39.]

Guest, Hon. Mrs. Lionel.—The Little Cow and Milk Book. (24 pp.) London: Central Committee for National Patriotic Organisations. [1916] 2½*d.* post free. [63.70(04).]

Wibberley, T.—Continuous Cropping and Tillage Dairy Farming for Small Farmers. (186 pp.) London: C. A. Pearson, 1916. 2*s.* 6*d.* net. [63.3(02), 63.70(02).]

Guest, Hon. Mrs. Lionel.—Cow and Milk Book. (175 pp.) London: John Lane, 1917. 1*s.* net. [63.711.]

Larson, C. W.—Milk Production Cost Accounts: Principles and Methods. (60 pp.) New York: Columbia University Press, 1916. [63.714.]

Birds, Poultry, and Bees—

Poultry Houses and Appliances. (156 pp.) London: Cassell, 1917. 1*s.* 3*d.* net. [63.6, 69.]

Paynter's System of Poultry Rearing, or £500 a Year from Hens. (162 pp.) London: "Country Life" Offices, 1917. 3*s.* 6*d.* net. [63.651(02).]

Wallace, R.—Heather and Moor Burning for Grouse and Sheep. (88 pp. + XV. Plates.) Edinburgh: Oliver & Boyd, 1917. 2*s.* 6*d.* net. [63.9.]

Forestry—

Taylor, J. L. B.—Handbook for Rangers and Woodsmen. (420 pp.) New York: John Wiley & Sons. London: Chapman & Hall, 1917. 11*s.* 6*d.* net. [63.49-19.]

Economics—

Ashby, A. W.—The Rural Problem. (40 pp.) London: National Adult School Union, [1916]. [338.1.]

Hall, A. D., and others.—British Agriculture, The Nation's Opportunity, being the Minority Report of the Departmental Committee on the Employment of Sailors and Soldiers on the Land, with an Appendix on the Reclamation of the Land. (168 pp.) London: John Murray, 1917. 3*s.* 6*d.* net. [338.1.]

Radford, G.—State Services. (142 pp.) London: Smith, Elder & Co., 1916. 3*s.* 6*d.* net. [338.98.]

Ashby, A. W.—Allotments and Small Holdings in Oxfordshire. A Survey made on behalf of the Institute for Research in Agricultural Economics, University of Oxford. (198 pp.) Oxford: Clarendon Press, 1917. 5*s.* net. [338.38(42).]

Radford, G.—Agricultural Co-operation and Organisation. 2nd Edition, revised. (154 pp.) London: Hodder & Stoughton, 1917. 3*s.* 6*d.* net. [334(02).]

Ponsonby, T. B.—Agricultural Labour. Standardisation as[a] Means of Improving the Conditions of Rural Employment. (29 pp.) Dublin: The Co-operative Reference Library, 1917. 6*d.* net. [331.]

Turnor, C.—The Land and the Empire. (144 pp.) London: John Murray, 1917. 3*s.* 6*d.* net. [338.1.]

(4960) Wt. P 14—99. 7 750 7/17. J. T. & S., Ltd.

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THE IMPROVEMENT OF LIVE STOCK IN ENGLAND AND WALES.*

In the year (1st April, 1916—31st March, 1917) covered by this Report the effects of the War upon agricultural conditions have become much more apparent. The scarcity of labour, the high price of feeding stuffs, and the difficulty often experienced in obtaining suitable sires have, to some extent, checked the development of the Board's Live Stock Scheme in some parts of the country.

The Scheme to improve the ordinary farm stock of the country was brought into operation shortly before the outbreak of War, and if before the War it was important that ignorant and careless stock-breeders should be educated to breed, rear and feed their animals on more scientific lines, it appears to be far more necessary at the present time that this work shloud be speeded up, and continue to receive Government assistance and supervision.

It is an acknowledged fact that the land in this country could be so cultivated that a much larger acreage of wheat and oats could be grown and a larger yield per acre could be produced, and it is equally important and quite possible that not only a much larger head of profitable stock should be bred and maintained in the future, but that the producing capabilities of our farm stock should also be so increased and improved as to yield on the average a far larger quantity of meat or milk per head than is at present the case.

The more grass land that is converted into arable the greater need there will be for more agricultural horses, notwithstanding the assistance which may be afforded to farmers in the supply of mechanical power by means of motor tractors, ploughs, etc., and if an increased acreage and yield of cereals is to be obtained it will be necessary to increase our live stock as well in order to fertilise the soil, for farmyard manure can rarely be replaced entirely by artificial manures.

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* Owing to the War, this article replaces the Annual Report on the Live Stock Scheme, which will, therefore, not be issued separately.

One of the main objects of the Scheme is to improve the quality of farm live stock, but there is evidence that it will be a means of improving their vitality as well. In many districts farmers have been and are still content to keep for breeding purposes animals which are descended from ancestors which have been in-bred for some considerable time. No record is kept of the pedigree of these animals. In many cases, even the sire or dam is unknown, and their owners have not recognised the necessity of introducing fresh blood into their herds or flocks The result is that animals which are too closely related are often mated together and produce offspring which are constitutionally weak and which often fail to thrive or mature in a satisfactory manner.

Under the Scheme the subsidised sires are a means of bringing a much needed " out-cross " of blood into many remote districts where in-breeding is very prevalent , doubtless, however, there still remain numerous localities not so distant where fresh blood is also needed. A society using a " Government " sire is compelled to make a change of blood before any danger of in-breeding arises, and the Live Stock Officer takes care that a new sire is not too nearly related to its predecessor. It is hoped, therefore, that in time the Scheme may tend to improve the strength and vitality of our live stock as well as their quality and meat- and milk-producing capacities, and that it will prove to the careless or ignorant stock-breeder that the mating of animals in a haphazard manner is economically unsound.

As was stated in last year's Report* most of the heifer calves sired by bulls located under the Scheme are either retained by their owners for breeding or are sold for that purpose, and the demand for such calves is greater than the supply. There is evidence, too, that many of the best of the male calves are sold for future use as bulls. This is an indication that the ordinary farmer is beginning to recognise the truth of what the breeders of pedigree stock have always maintained, *i.e.* that a well-bred animal is more profitable than a mongrel.

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* See Journal, Aug., 1916, p. 417.

It is very desirable that this view should become general, as at the present time it is of national importance that the greatest care should be taken in the selection and mating of breeding animals on farms. The number of our live stock is almost certain to be reduced owing to the War, and those of them which can be spared for breeding during the present crisis ought to be the choicest of their kind. It is expedient therefore, that breeders, whether they own pedigree animals or not, should set aside and use for stud purposes those animals which are most likely to beget healthy, strong offspring, capable of producing the maximum amount of meat, milk or wool, or, in the case of horses, progeny that are most likely to grow into the class of animal best suited to the agricultural, military and commercial needs of the country. By careful selection and mating the studs, flocks and herds, which are a great national asset, can be maintained and improved to the benefit of the farmers and the welfare of the nation.

For the year under review the amount of the grant made available from the Development Funds was as follows :—

	£
Boars	1,000
Bulls	12,550
Heavy Horses	6,050
Milk Recording	1,500
	£21,100

and the progress that the Scheme has made during the three years it has been in existence is shown in the following table : —

Year (1st April to 31st March)	Boars			Bulls			Horses		Milk Recording.	
	Societies	Individuals	Boars	Societies.	Individuals	Bulls.	Societies.	Stallions	Societies	Cows.
1914–15 ..	100	Nil	107	285	26	370	65	72	16	7,331
1915–16 ..	180	Nil.	193	489	28	633	88	97	20	9,811
1916–17 ..	186	15	216	543	15	659	93	108	22	12,950

Unfortunately, many societies have been compelled to cease operations owing either to members being called up for military service, to shortage of labour, or to other war difficulties, but in spite of abnormal conditions, development continues to be shown, and the progress made may be regarded as not unsatisfactory.

Grants for Bulls.—This section of the Scheme has continued to prove popular and successful. The number of sires located has increased from 633 in 1915–16 to 659 in the year covered by this Report. There has been, in some instances, a marked increase in the prices paid for these sires, and although this can be attributed in some measures to the high prices ruling for live stock, there is no doubt that the Scheme is tending to increase the demand for well-bred sires throughout the country. The number of changes of bulls that have taken place during the year has revealed this increased demand. In connection with the prices paid for subsidised bulls it is of interest to record that a bull, which was used by a society under the Scheme, and which was bought for that purpose for 44 guineas, was sold for export for £120, and eventually resold in the Argentine for £426.

Representations have been received from societies urging the prohibition of the use of inferior or unsound bulls, and while the Board are of opinion that the time is not yet ripe for action in the direction suggested they regard the representations as evidence of a growing appreciation both of the necessity and of the desirability of using only sound and high-class animals. As evidence, too, of the awakening interest in the proper breeding of live stock there is a growing desire for the establishment of calf registers in connection with milk-recording societies and bull societies.

The number of bulls located at the close of the year 1916–17 was 659, of which 644 were provided by 543 societies, and the remainder by 15 individual owners. Of these bulls 484 were located in England and 175 in Wales. The number of bulls actually purchased and owned by societies was 63, the other 581 being hired by societies from bull owners.

The average prices paid for bulls were as follows:—£46 15*s.* 6*d.* for Devons, £45 10*s.* for Shorthorns, £44 15*s.* for Lincoln Reds, £42 12*s.* for Herefords, £40 6*s.* for South Devons, and £32 9*s.* 6*d.* for Welsh Blacks. The highest price paid for a bull was £120 for a Shorthorn.

The service fees of these bulls varied from 2*s.* 6*d.* to 10*s.* 6*d.*

Of the bulls located: 426 were Shorthorn, 67 Hereford, 63 Lincoln Red, 46 Devon, 36 Welsh Black, 13 South Devon, 4 Aberdeen Angus, 2 Guernsey, 1 Jersey and 1 Sussex.

Grants for Boars.—The number of boars located has increased from 193 to 216 during the year 1916–17. It has been found increasingly difficult to form societies, and in view of the high price of feeding stuffs and the scarcity and enhanced value of suitable boars, there has been some hesitation among existing societies as to continuing their operations. It was thought, therefore, that if grants were made to individual boar owners, as is done in the case of bulls where societies cannot be formed, there might be some inducement to owners of good boars to continue to keep their animals and to let their neighbours have the use of them for their sows. Towards the end of the year the Board decided accordingly to award "individual" grants, and a number of boars have been located already under this arrangement.

Of the 216 boars located: 97 were Large White, 50 Large Black, 22 Gloucester Old Spots, 14 Berkshire, 17 Lincoln Curly Coat, 10 Middle White, 4 Cumberland and 2 Large White Ulster, and the average price was £8 7*s*. 6*d*. per boar. The service fees varied from 1*s*. 6*d*. to 6*s*.

Grants to Heavy Horse Societies.—The amount of the grant available for heavy horse breeding was reduced. It was thought advisable to reduce the amount of the grant awarded to each society rather than to reduce the number of societies receiving a grant. This reduction had little, if any, deterrent effect on the activities of the various societies, and, as in previous years, the number of applications received by the Live Stock Committees was greater than could be met. The number of societies operating in 1916 was 93 with 108 stallions, as compared with 88 societies and 97 stallions in 1915. The number of mares served by the 108 stallions was 9,995, an average of 92 mares per stallion. Assisted nominations (*i.e.* payments not exceeding half the normal service fee) were paid by the Board in respect of 2,181 of the mares which belonged to farmers whose holdings did not exceed 100 acres. The average hiring fee paid for the stallions was £244, and the average service fee approximately £2 11*s*.

The above figures do not include the operations of the Cumberland and Westmorland Heavy Horse Society. As was pointed out in the last Report, the procedure followed in these two counties differs somewhat from that adopted in the rest of the country. Assisted nominations were issued in respect of 394 mares belonging to members of the society, and those mares were served by 50 selected stallions.

Milk-recording Societies.—In no other section of the Scheme have the difficulties arising out of the War been so apparent as in that of milk recording.

Most dairy farmers and members of their family, male and female, are now obliged to do much more manual labour, as so many of their skilled and intelligent labourers and milkers have been called up. Successful milk recording entails careful, regular, and intelligent weighing of the milk and entering of the records, and even members of societies, who are keen on milk recording, have found it very difficult to find time for the proper carrying out or supervision of the work during the past year, and new members have been very chary of joining societies during the War. The farmer, as a rule, is not fond of clerical work, and until he has had some experience of milk recording he is apt to think it involves much more writing and " figuring " than is actually the case.

The success of a milk-recording society depends largely on the keenness and intelligence of its secretary and recorder, and especially of the latter, as the members as a rule look to him to conduct the operations of the society. The difficulty in obtaining and retaining suitable recorders has been especially great, as so many of them were young men of military age. Young women have in some instances undertaken this work, but the early hours and long journeys on country roads make it a very arduous task for them during the winter.

Added to the above difficulties there was a feeling of uneasiness among milk producers as to whether they would be able to conduct their business at a profit, and many were inclined at one time to sell all or a portion of their herds, and in view of all the adverse circumstances it may be regarded as satisfactory that there has been an increase in the number of societies and in the number of cows owned by members.

The number of milk-recording societies in operation at the end of the year under review was 22 as compared with 20 during the previous year. There were 441 members and they owned between them 495 herds, comprising 12,950 cows. An increase on last year's figures of 91 members, 97 herds and 3,150 cows.

The number of milk-record certificates issued during the year was 834. The highest yield recorded was one of 17,740 lb.; two cows gave yields of approximately 15,500 lb., and many others had records of over 10,000 lb.

As an illustration of the influence of the Scheme in securing an increased production of milk, it may be of interest to record that a society whose members owned 464 cows increased its milk production during its second year of operations by 36,000 gal., though the number of cows was only increased by two. An increase of milk in one society to a value of approximately £1,800 is good business both from the national and from the dairy farmers' point of view.

The following are the principal memoranda and forms used in connection with the live-stock operations of the Board, and copies of them can be obtained free of charge on application to the Secretary, Board of Agriculture and Fisheries, Whitehall, Place, London, S.W. 1. :—

L. 1.—Memorandum on the Live Stock Scheme.
L. 2.—Regulations as to Bull Grants.
L. 3.—Regulations as to Heavy Horse Grants.
L. 4 and L. 79.—Regulations and memorandum as to Milk Record Grants.
L. 11 —Regulations as to Boar Grants.

APPENDIX.

Showing the Amount of the Grants Authorised and the Number of Sires and Milk Recording Societies Subsidised in 1916-17.

Province and District	Boars		Bulls		Horses		Milk Recording		Total Authorised for Province
	Amount Authorised	Sires Subsidised	Amount Authorised	Sires Subsidised	Amount Authorised	Sires Subsidised	Amount Available	Societies Subsidised	
	£		£		£		£		£
1 Armstrong College	39	4	[illegible]	15	610	*5	200	2	1,089
2 Manchester University	46	8	[illegible]	48	[illegible]	2	175	2	1,593
3 Leeds University	81	15	1,094	51	605	12	50	1	1 830
4 Harper Adams College	60	15	1,107	45	320	8	nil	nil	1,487
5 Midland College	66	21	1 086	68	425	6	175	4	1,746
6 Cambridge University	132	9	1 000	35	950	18	300	5	2,382
7 South Eastern College	57	12	676	30	260	3	100	1	1,095
8 Reading College	147	20	918	42	430	5	150	2	1,645
9 Bristol University	118	45	1,495	92	710	17	350	5	2,673
10 Seale Hayne College	60	10	928	58	360	5	nil	nil	1,348
England	808	159	9,790	484	4 790	66	1,500	22	16,888
11 Aberystwyth College	108	34	1,605	104	674	11	nil	nil	2 387
12 Bangor College ..	84	23	1,155	71	586	11	nil	nil	1,825
Wales .	192	57	2,760	175	1,260	22	nil	nil	4,212
England and Wales.	1,000	216	12,550	659	6,050	108	1,500	22	21 100

* Exclusive of the Cumberland and Westmorland Society.

THE "BLOSSOM WILT AND CANKER" DISEASE OF APPLE TREES.*

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(*Mycological Department, South-Eastern Agricultural College, Wye, Kent.*)

A DISEASE of apple trees, whose virulence has been steadily increasing for several years in the south-eastern counties of England, has recurred during the present summer with greater intensity than in previous seasons, the result being that on many fruit farms the crop from the more susceptible varieties of apple trees has been reduced to one quarter or even less. Specimens of affected trees have been received at Wye College not only from the south-eastern counties but also from other parts of the country, so that although the greatest amount of damage appears to have been caused in Kent and Sussex the disease is probably widely distributed.

The variety of apple that is found to be most readily attacked is Lord Derby, but Cox's Orange Pippin, James Grieve and Ecklinville Seedling are often severely damaged. The disease occurs also on the following varieties :—Duchess of Oldenburg. Worcester Pearmain, Allington Pippin, Early Julyan. Lane's Prince Albert, Lord Grosvenor, Prince Bismarck, Chelsmford Wonder, Newton Wonder, Domino, Beauty of Bath, Warner's King, Keswick Codlin, Bramley's Seedling, Duchess' Favourite. Rival, Fearn's Pippin, Dartmouth Crab, Ribstone Pippin and Hanwell Souring. On the very susceptible varieties, it is not uncommon to find from 50 to 75 per cent of the flowering spurs killed by this disease in a single season.

The following extracts from letters received this year indicate the extent of the damage that may occur where no efforts are made to keep the disease under control .—

" My Derbys are badly attacked and Keswicks a little. I should say I lost quite 150 bush. of Derbys ; I sent 13 bush. to market. My Bramleys, Red Allenbury, Besspools, Sourings and Cox's Pomona were quite free although in the same orchard."

" Many trees after being affected three or four years have been practically killed. The Derbys' crop has been cut down to half or less. I have grubbed out 600 trees."

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* A more detailed description of this disease and of the fungus causing it appears in *The Annals of Applied Biology*, Vol. III., No. 4, April, 1917, pp. 159–204.

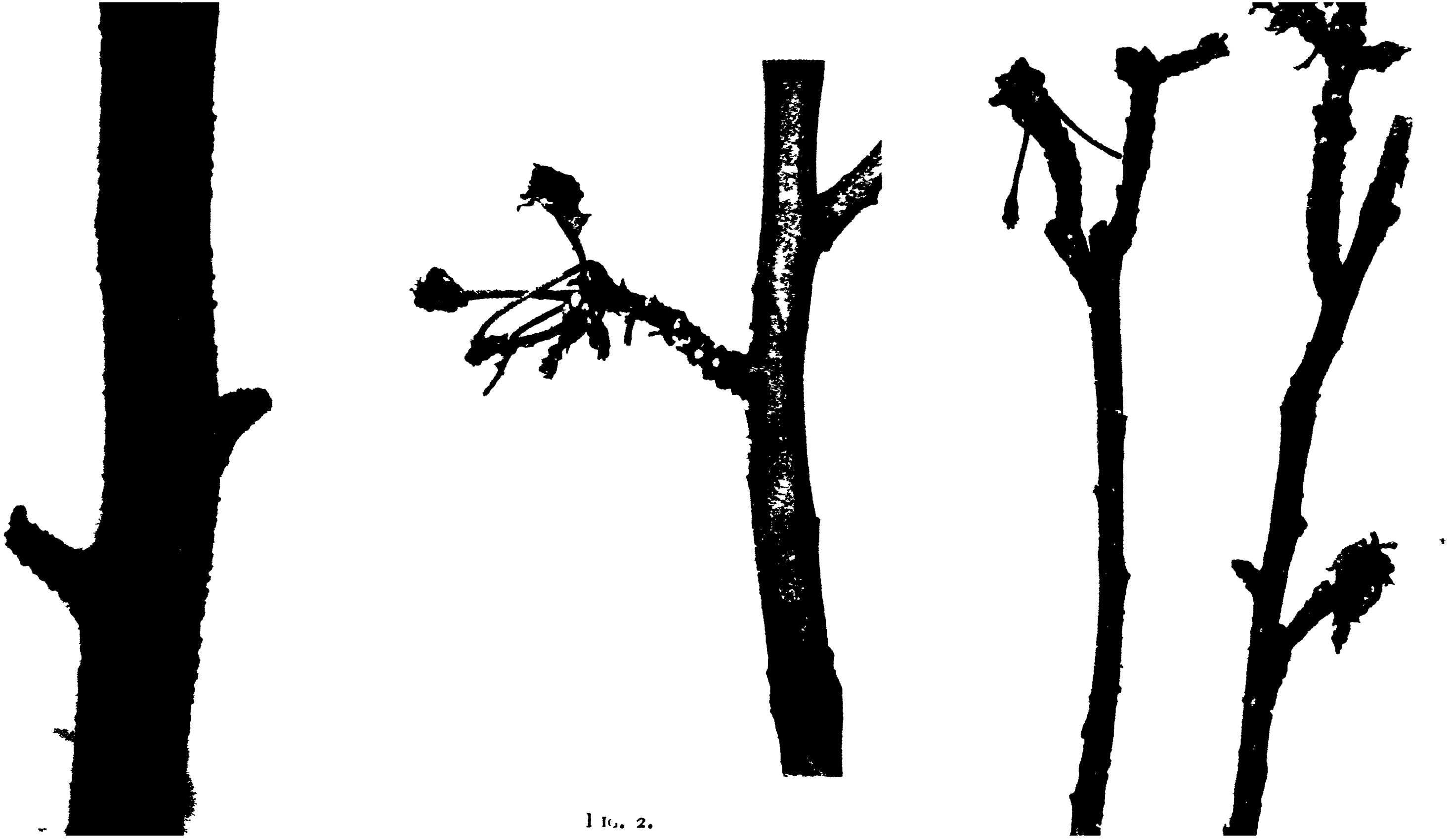


FIG. 2.

" The disease is worst in the Ecklinvilles, some trees of which last year bore scarcely any crop at all on account of it."

" The enclosed apple blossom is from Lord Derby Apple—it is a specimen of how all the Derby trees are going on our farm, and some trees are practically dying."

" In my own experience this disease has got rapidly worse year by year; last year it was much worse than I have ever seen it before. It is difficult to supply an estimate of damage done, but I should say on Early Julyan it scarcely affected the crop at all, on Ecklinville Seedling damage was done to about 10 per cent. of the crop, while on Lord Derby, in one piece 30 per cent. of the crop was lost and also 30 per cent. of the tree had to be cut away last year."

It will be seen from these extracts that the Lord Derby variety is remarkably susceptible, to attack from this disease. In the Weald of Kent this variety is extensively grown, and in those orchards where the disease has been allowed to develop unchecked for several seasons the trees are now unproductive, and in many cases it has been found necessary to top-graft them with a more resistant variety. For this purpose Bramley's Seedling has usually been employed, as this is not only a strong growing variety, but is much less liable to become infected with "blossom wilt," although observation and experiment have proved that it is not entirely immune. This comparative immunity of Bramley's Seedling was shown in a striking manner in a mixed orchard in the Weald where a tree of this variety was growing in close proximity to several badly infected Lord Derby trees, each bearing some hundreds of dead spurs and cankers. A thorough search only revealed one such spur on the Bramley's Seedling.

Trees of all ages suffer from this disease. On large standard Lord Derbys it frequently causes great damage because it is easily overlooked in the first stages of the disease, or if noticed at all is not considered of sufficient importance to warrant any special treatment, and neglect is certain to lead to worse damage during the succeeding season. Younger trees of this variety are equally susceptible, and infection often causes the death of some of the main limbs. In Fig. 1 is shown a portion of a large canker obtained from a young Lord Derby tree about 6 years old; the canker had girdled the branch for a considerable distance and that portion above the canker was dead. Fig. 6 shows the main stem of a young cordon apple tree (var. Rival) obtained from the fruit plantation at Wye College during the first summer after the trees were planted out. The tree had become infected through a spur near the middle of the stem, and the resulting canker caused the death of the upper half of the tree. In this case there were no other diseased trees in the immediate neighbourhood, so infection must have arisen from wind-borne spores, which had been carried for some distance.

The first evident symptom of the disease is the "blossom wilt" condition. About a fortnight after the flowers begin to open on affected trees there are to be seen fruiting spurs on which the leaves are beginning to wilt; within a day or two these drooping leaves become brown and withered, usually with incurved margins, thus showing their under-side; all the flowers of such trusses are brown and dead. This condition is in itself serious, since in severe attacks from a half to three-quarters or more of the fruiting spurs may be killed in this way; it is frequently followed, too, by the more serious "canker" condition. The fungus causing the disease advances along the tissues of the spur, and if it reaches the branch will continue to grow first in the bark and later in the wood until in certain cases the branch is completely girdled; that portion above the canker then dies. In Fig. 7 is seen a canker that had just girdled the branch, infection having arisen through the truss of flowers on the left; the leaves at the upper end of the branch were at this stage turning yellow and wilting.

Fig. 4 shows that several trusses on a branch may become infected; in this particular case the terminal portion of the branch was quite dead by reason of the cankers developing round the bases of the affected trusses lower down. This specimen also illustrates the rapidity with which the fungus travels down the spur into the branch. The tree from which it was taken began to flower that year about 1st May, and the first signs of wilting occurred about the middle of the month, while the condition shown in the illustration was induced by 31st May. Fortunately such a rapid development of the fungus in the spur or branch tissues continues for a few weeks only, and generally its further extension into the tree is arrested about the end of June; cankers formed by that time show no further increase in size either that season or subsequently.

During dry weather the fungus causing the blossom wilt does not, as a rule, appear at the surface of the diseased flowers or spurs. In a moist atmosphere, however, it may be found on the flowers and flower stalks as small rounded pustules consisting of numerous chains of spores (conidia). On the surface of the spurs and cankers the fungus does not make its

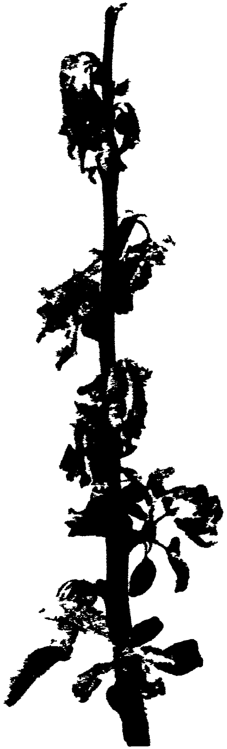
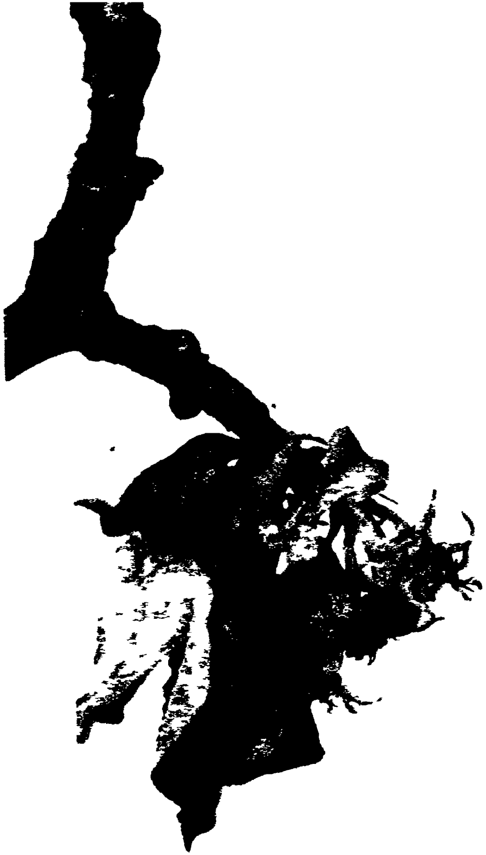


FIG. 4



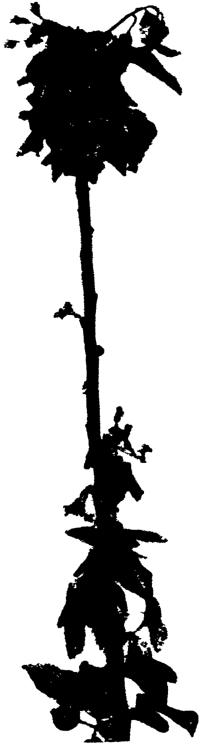


FIG. 6.

appearance until much later in the year. During December the immature pustules may be found bursting through the bark and they continue to increase in number during the winter months. In spring these pustules become powdery with spores, and by the time the trees come into bloom they are liberating myriads of these reproductive bodies, many of which fall into the flowers as they open and so produce a new infection resulting in blossom wilt (see Fig. 5).

Since these spores are exceedingly minute (averaging about $\frac{1}{2500}$ of an inch in length) they are easily carried in the air for considerable distances and so give rise to outbreaks of the disease in plantations hitherto free from it. It is found, however, that the wilted trusses are by far the most numerous in the vicinity of cankers or of dead spurs bearing pustules, those trusses situated immediately below such spurs or cankers being particularly liable to infection. Thus, in general, it may be stated that, although infection must at times take place through spores which are carried by the wind from one tree to another, or from one plantation to another, the great majority of wilted trusses on a tree are infected from pustules of the fungus borne on spurs and cankers on the same tree. Growers have sometimes stated that a severe outbreak of blossom wilt has occurred on trees where it had not been previously observed. When such a case has been investigated a careful search on the tree has revealed the presence of a number of dead spurs bearing the fungus, these being the result of an attack during the preceding year and serving as sources of infection for the new crop.

The fungus causing the blossom wilt is *Monilia cinerea*, a form which is closely related to but quite distinct from that which causes the "brown rot" of the ripening fruit and which is very destructive to stored apples. Brown-rot (*Monilia fructigena* = *Sclerotinia fructigena*) is commonly found on apples still attached to the tree or on the fallen fruit, and is seen as numerous yellowish pustules bursting through the skin and growing usually in concentric circles; the infected apples which remain on the tree eventually become "mummified." The grey *Monilia cinerea* is invariably obtained from wilted flowers and from dead spurs infected through the flowers; so far as observations in Kent have gone it has not been found on the mature apples in the open* though occasionally it occurs on the young fruit. This *Monilia* obtained from diseased spurs and cankers has been examined in the open and in the laboratory, and numerous pure cultures have been prepared for comparative studies and for experimental purposes. It differs from *M. fructigena* in its grey pustules and smaller spores; it is also distinguished by its different habit of growth when growing on sterilised media in the laboratory.

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* Experiment has shown that it readily causes a rot of apples when these are *artificially inoculated* with the fungus.

That the fungus is the direct cause of the blossom wilt has been proved by experiments carried out in the greenhouse and in the fruit plantation at Wye College during the season of 1916, and these have been repeated in the open this year. Apple flowers were inoculated with spores taken from pure cultures of the fungus; these spores were placed on the stigmas of the flowers, and the result was that in about a fortnight the typical blossom wilt condition appeared in the majority of the inoculated spurs. In Fig. 8 is seen the result obtained within 16 days after placing spores from a pure culture upon the stigmas of a single flower in the truss on the left; this truss, with its drooping, withered flowers and leaves, shows the typical symptoms of the blossom wilt; the one on the right was used as a control (*i.e.* it was not treated in any way). In another case a truss similarly infected was killed in 12 days, and four days later a canker was to be observed on the stem round the base of the dead spur. Figs. 9, 10, and 11 also show the result brought about by inoculating the flowers with spores of the fungus. Near the centres of Figs. 9 and 10 is a cluster of six trusses of blossom; in a single flower of each of four of these the spores were placed. After about three weeks the result was as shown in Fig. 9. Nine days later the fungus had invaded the branch from the spurs and formed cankers, so that the leaves at the upper end of the branch began to wilt also (Fig. 10). At this stage the organism was in the form of fungal threads (*mycelium*) within the tissues of the spur and branch. During the succeeding winter, however, the fungus appeared at the surface of the bark in the form of powdery pustules, and Fig. 11 shows the same branch the following spring.

It is found that when the spores of this fungus are placed in water they germinate within a few hours, producing a germ tube which soon becomes branched, so probably the tissues of the infected flowers are invaded shortly after the spores fall on them. In the experiments carried out at Wye College the spores germinated on the stigmas and the germ tubes travelled down the styles to the centre of the flower, then along the flower stalk into the spur. The other flowers and the leaves borne on that spur then began to wilt. This occurred in from

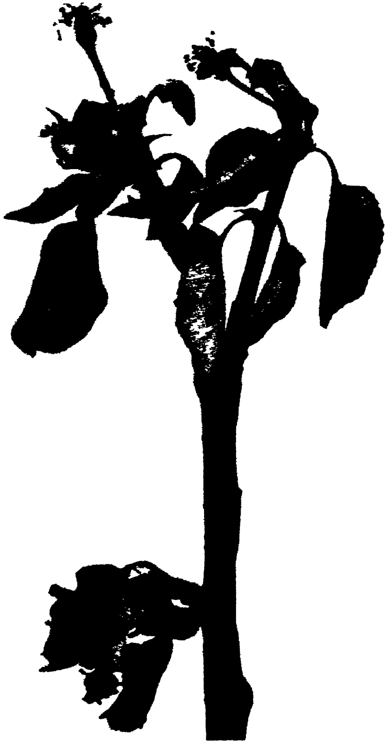

Fig. 7

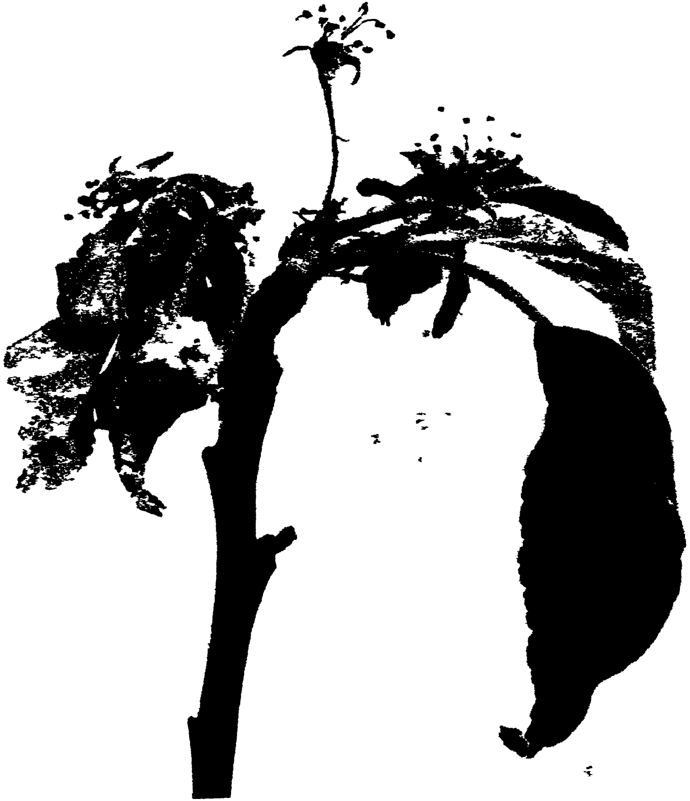

Fig 8

11 to 15 days after inoculation, so that the first conspicuous symptom of the disease, that is the wilting of the leaves round the base of a truss of flowers, occurs about a fortnight after infection has taken place.

When the infected flowering spur is 3 or 4 in. long the development of the fungus is usually arrested before it can reach the branch itself, but when the spur is a short one (½ in. to 1 in. in length) the branch is soon invaded and a canker is formed.

CONTROL MEASURES.

In considering the best method for controlling this disease it is necessary to emphasize the following points :—

(1) Infection occurs through the open flowers.
(2) The leaves of affected spurs begin to wilt about a fortnight after the flowers are infected.
(3) Infection arises almost exclusively from the pustules of the fungus produced on spurs and cankers.
(4) When an infected truss of flowers is borne on a short spur the fungus soon invades the branch, itself producing a canker which may completely girdle it and so kill that portion of the branch above the canker.
(5) The cankers do not increase in size after about the end of June.
(6) The dead spurs and the cankers formed in any one season produce during the following winter and spring a crop of spore-bearing pustules, which are ready to infect the flowers as they open in spring.

There are three possible ways of treatment :—

(*a*) The removal of the cankers and all infected spurs.
(*b*) Spraying to destroy the pustules.
(*c*) Spraying to prevent the pustules from liberating their spores during the period that the flowers are open.

Since infection takes place through the flowers it is evident that a spray fluid cannot be employed for the purpose of forming a protecting film over the organs liable to infection, and spraying experiments carried out with the object of either killing the pustules or preventing them from shedding their spores have not yielded satisfactory results; so at present fruit growers are strongly advised not to attempt to control this disease by spraying as they are extremely likely to waste their time and money. It has been found that the washes generally used for checking the spread of fungus disease, as for instance, lime-sulphur and Bordeaux mixture, are useless as they fail to wet the pustules.

To wet the pustules completely mixtures containing soap were found to be necessary, and several such fluids, including Bordeaux mixture, soda Bordeaux (usually called Burgundy mixture in this country), cupram and ammonium sulphide, each containing 1 per cent. soft soap, were tested. Under laboratory conditions these spray fluids killed the spores at the surface of the pustules, but when the spraying was carried out in the open a few days before the flowers expanded, it was found that the pustules grew through their sterile surface layer and became powdery by the time the flowers opened. It should be remarked, however, that the weather conditions during the spring of this year* were very favourable to the development of the fungus. Spraying with a lime wash was not successful either, for although some of the pustules became covered, or partially covered, with a coating of lime, the fungus grew through this during a period of wet weather. The most promising results were obtained with a solution of caustic soda containing soft soap, used as a " winter wash." Under certain conditions this destroyed the pustules, but when tried on a practical scale in an orchard the result was not such as to warrant recommendation. Even were a mixture discovered capable of effectually controlling the blossom wilt disease. spraying should only be resorted to as a temporary measure—*i.e.* as a measure to be employed on neglected trees which have become so infested with the disease that with the available labour it is impossible to cut out all the parts which serve as sources of infection—for in general it is a bad practice to leave dead branches or twigs on the trees.

The only method of completely eradicating the disease from an orchard is by the removal and destruction of all infected spurs and cankers. This may be done either in summer or in winter. As already indicated, the disease is first made noticeable by the wilting of the trusses of flowers and of the leaves around them. If the spurs bearing such affected flowers are cut away as soon as the leaves wilt, the fungus is prevented from reaching the branches and producing cankers. Such treatment is by far the best, but in order to carry it out several examinations of the trees would be required during the third and fourth weeks after the flowers first opened. This would scarcely be practicable except on young trees and in small plantations or in gardens. Usually, on large fruit farms it would be possible

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* Just before the apple trees came into flower there was a week of very wet weather which caused the pustules to become larger and more powdery; this was followed by a period of dry weather with breezes which dispersed the spores.

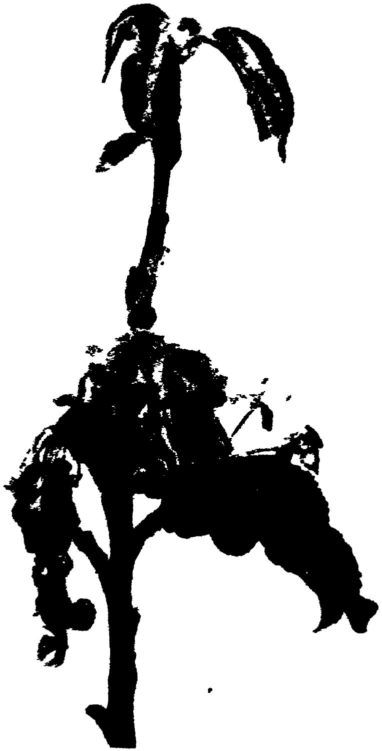

FIG. 9

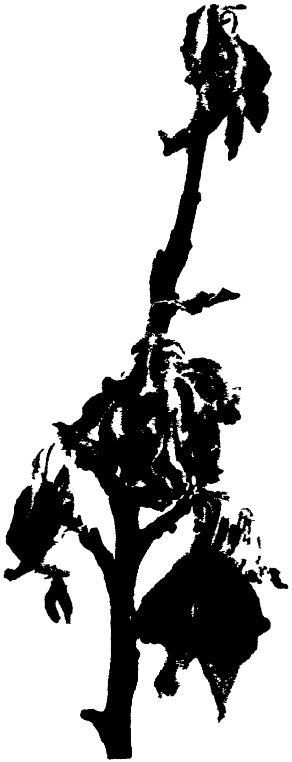

FIG. 10.

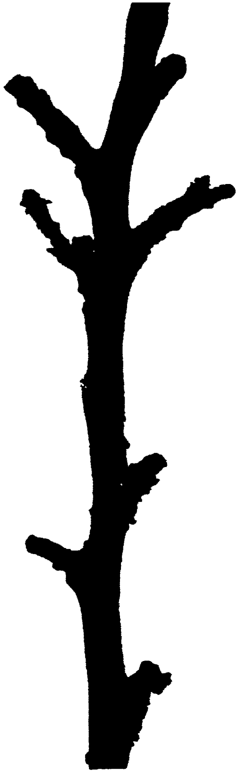

FIG. 11.

to examine the trees and cut out diseased portions once only during the season, and the best time for the operation is about the fifth week after the trees come into bloom; by that time all the infected trusses can be recognised by their withered leaves, and although in some cases cankers will have formed already, there will be less damage to the trees than if the treatment is delayed. In any case, wherever possible it should be done during the summer when the brown withered leaves of infected spurs contrast with the living ones and are a sure guide to places where the knife is required.

That this mode of dealing with the disease in summer is highly effective has been proved experimentally and confirmed by observations made in plantations and orchards in Kent where the method has been adopted.

In 1915 a row of trees (var. Warner's King) in the fruit plantation at Wye College was affected by blossom wilt. From nine of the trees all the withered trusses were pruned off and the spurs cut back until a clean cut was obtained in each case, *i.e.* until all the brown, dead bark and wood had been removed; as this was done about the middle of June many cankers had to be cut out of the branches during the operation. In the following year five of these trees were quite free from the disease, one had a single dead truss and the other three had two each, *i.e.* an average of less than one dead truss per tree. The rest of the trees in the row (15 in number) had been less thoroughly treated, and in the spring of 1916 the dead spurs which had been allowed to remain bore pustules of the fungus so that all the trees became infected, with an average of eleven* wilted trusses per tree.

It is essential in removing a dead spur that it should be cut back until the living wood and bark be reached; particularly is this necessary when the work is done early while the fungus is still travelling through the tissues. An instance of imperfect pruning was seen this year in a plantation of young Lord Derby trees; the dead trusses had been removed soon after wilting but care had not been taken to cut out the whole of the brown, diseased parts. About a fortnight later it was found that in numerous cases a canker had developed round the base of spurs which had not been pruned with sufficient thoroughness. The result was that many of the main branches became girdled by cankers and died.

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* This number would have been much higher but for the fact that the trees that year (1916) produced very little blossom, so that there were comparatively few flowers to infect.

If the removal of dead spurs and cankers is left over until winter, either from lack of labour or because the disease was not previously recognised as serious, the affected parts are not so readily distinguished and the cutting away is therefore more difficult to do. Winter pruning can be done any time during the winter or spring before the bloom buds begin to open. In one orchard brought under our notice this year. a number of Lord Derby apple trees were pruned thoroughly to remove all spurs and cankers bearing the fungus ; nevertheless the trees bore a considerable number of wilted trusses for which no source of infection could be detected, and the results appeared unaccountable until it transpired on inquiry that the pruning operations had not been carried out until after the trees had come into bloom, so that many flowers had become infected before the sources of infection had been removed.

The winter treatment even when done carefully usually results in a number of dead spurs and twigs being overlooked, and the trees should be examined early in the following summer for signs of blossom wilt ; if several dead trusses are found near together, further search is sure to discover in their vicinity a spur or canker which had not been cut away. One striking example occurred in a plantation of young Derbys. Most of the trees had been pruned thoroughly and no wilted trusses were found on them. but near the centre of one tree a dead twig with numerous pustules had been overlooked. Within about a foot of this twig there were no less than ten dead trusses of bloom, each of which if left until the following year would have created a fresh source of infection.

Fruit growers in districts where this disease is known to be prevalent are strongly advised. therefore, to examine their apple trees in summer when the blossom wilt condition is most conspicuous, and if possible to cut out then all affected parts ; failing that, the operation may be carried out during the winter or spring, but it must be done before the trees come into flower.

That this recommendation is not impracticable has been proved by certain growers in Kent and Sussex who have carried out the instructions received from Wye College. One grower wrote in 1916 : " To cut off and burn the millions of diseased spurs and shoots on apples and plums is quite impracticable here ;" but this year he says, " I withdraw that statement," since he finds that the task is not an impossible one. Another grower trained women to recognise the disease in winter and to cut out affected spurs and cankers from large standard trees some 15 ft. high. The results have been excellent, and the loss which threatened to be a most serious one, was almost negligible. The trees were practically free from blossom wilt when examined in June, and the few wilted trusses which were present were easily dealt with.

DESCRIPTION OF FIGURES.

Fig. 1.—Portion of a large canker from a young Lord Derby apple tree showing numerous pustules of the fungus.

,, 2.—A dead spur and canker which has half girdled a branch—winter condition.

,, 3.—Dead cankered twigs bearing pustules.

,, 4.—Branch bearing several infected trusses.

,, 5.—Below is a wilted truss which has been infected by spores falling from the pustules present on the spur above.

,, 6.—Main stem of a young cordon apple tree with upper half killed. Infection occurred at a truss near the middle of the stem.

,, 7.—Below is a canker which has just girdled a branch; the leaves on the twigs above are beginning to wilt.

,, 8.—The truss on the left was infected by placing spores in a single flower; result 16 days after the inoculation.

,, 9.—A branch on which four flowers were inoculated with spores; result about three weeks after inoculation—five trusses are dead.

,, 10.—As in Fig. 9, but nine days later; a canker has arisen killing the branch.

,, 11.—The same branch as shown in Figs. 9 and 10, showing the condition in the following spring; pustules of the fungus are present.

REPORT ON AN INFESTATION OF LARVÆ OF THE ANTLER MOTH (*CHARÆAS GRAMINIS*, L.) IN THE PEAK DISTRICT.

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AND
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TOWARDS the middle of June in the present year, reports were received that large numbers of caterpillars were present on the hill pastures in the High Peak District of Derbyshire. It was stated that they were principally feeding on the rough grasses, but that in certain districts, they were attacking the better meadow land and an occasional corn crop, and that they had even penetrated into gardens. Information was received from several sources to the effect that they were also invading the valleys, and fear was expressed that they would commit similar depredations among the larger areas of cultivated land there.

On investigation, the caterpillar proved to be that of the Antler Moth (*Charæas graminis*, L.) belonging to the family of the Noctuidæ. It varies from greenish-brown to bronzy-brown in colour with three longitudinal yellowish lines or stripes along each side of the body; a single unpaired stripe also runs down the middle of the back. The whole of the skin is finely wrinkled in a transverse manner, which is a characteristic feature of this particular species. It is devoid of hairs; the under surface of the body is lighter in colour, and the head is dark brown. The first three segments or rings of the body carry a pair of true legs; four pairs of false legs are borne on 6th to 9th segments, and a terminal pair on the last segment.

Life History of the Antler Moth.—When fully grown, the caterpillar measures rather more than an inch and a quarter in length, and large specimens are nearly a quarter of an inch in breadth. At this stage it seeks shelter beneath the surface of the turf, and occasionally under slabs of stone or in crevices of the stone walls that are usually present in the higher hill pastures. It becomes sluggish and, after forming a frail cocoon, passes into a pupa or chrysalis. In this quiescent stage it is at first orange-brown, but gradually becomes a dark mahogany colour. The time spent in the pupa stage depends upon the prevailing climatic conditions. In the case of the present infestation the writers first met with the pupa on 15th June; a few more were found on 18th and 25th June. On the latter date most of the larvæ in the Glossop district had passed beneath the surface of the ground preparatory to pupation. The emergence of the adult moth from the pupa commences in July, and the moths may be found on the wing up to September.

The insect measures an inch and a quarter to nearly an inch and a half across the expanded wings, the male being rather smaller than the female. With regard to colour, the fore wings are most commonly of various shades of brown or greyish-brown, with a pale conspicuous branched streak which has been compared with the antlers of a deer, and has given rise to the name by which the moth is commonly called. In some examples, however, the brown is replaced by reddish-brown or olive, there being considerable variability in this respect. The hind wings are grey, becoming darker toward their outer margin.

The moth is frequently seen on moorlands in the daytime, hovering over heather and grass, or at the flowers of ragwort, thistles, etc. As a rule the male is most commonly found in the forenoon, but in the afternoon up to about 5.30 p.m., or later, both sexes are seen. The moth also flies at night, and it has been noticed that the male is often attracted by lights. The insect is widely distributed throughout the British Isles, and is especially abundant in the midlands and north of England, but less plentiful in the more southern counties. In Ireland it is universally common.* Abroad, it occurs in Northern and Central Europe, Northern Asia and North America.† During the month of August on a suitable afternoon the female moth may often be seen dropping the eggs from her body while flying. These fall among the grasses which serve as the food-plants of the future caterpillars.

With regard to the time of hatching of the egg and as to how the insect passes the winter, information is conflicting.

Thus, according to Ritzema Bos, the young caterpillar issues from the egg about three weeks after the latter has been laid, and hibernates through the winter. Taschenberg also states that the young caterpillar hibernates during the winter. Buckler, on the other hand, states that the egg hatches sometime during the spring, and the insect consequently remains in the egg stage throughout the winter. Meyrick* gives April to June as the months when the larvæ occur. Miss Ormerod† states that the egg soon hatches, and that the caterpillar hibernates during the winter and recommences feeding in spring. She also quotes evidence supplied by several correspondents which support that same conclusion. Reh‡ mentions that the egg hatches in about three weeks and the young caterpillar passes the winter in the earth. Siebke§ remarks " Larva in graminibus, pratos interdum valde vastans, sublapidibus semiadulta hibernat." According to Barratt‖ the winter is passed in the egg state.

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* KANE, W. F. DE VISMES.—*Catalogue of the Lepidoptera of Ireland*, *Entom.*, 1894, p. 264.

† MEYRICK, E.—*Handbook of British Lepidoptera*, London; 1895, p. 75.

Previous Outbreaks.—Sudden outbreaks of the caterpillar have been recorded from time to time in various parts of the country. Thus, Curtis¶ states that in July, 1827, the grass on a large portion of one side of Skiddaw appeared dead, and multitudes of the caterpillars of the Antler Moth were crawling about. The years 1830 to 1836 were remarkable for plagues of these caterpillars in South Scotland. Miss Ormerod** gives a useful summary of numerous infestations, mentioning outbreaks at Clitheroe (Lancs) in 1881 ; an area of about 10 miles of Glamorganshire, West of the Rhondda Valley in 1884 ; and over the hill pastures of Ettrick and Yarrow, (Selkirkshire) in 1885. In 1885, there was a wide infestation of the hilly sheep runs in south-west Scotland, embracing many square miles, situated in at least seven counties. It also appeared to a lesser degree over parts of the same area in the following year. In 1898, it was recorded as being present in some numbers in Surrey, though it is doubtful whether any severe infestation has ever been recorded so far south. The latest previous attack in Derbyshire which the writers have been able to trace, occurred in or about the year 1881, but no details relative to the severity of the outbreak are forthcoming. One of the writers investigated a slight outbreak in Glamorganshire in 1910, but the attack was too far advanced for the organisation of any measures of control.

The Present Infestation.—As regards the present outbreak, the earliest report came from Kinver End, where great numbers of the caterpillars were noticed on 26th May. On 11th June, it was observed on the hills at Castleton and at Whaley Bridge on or about 8th June. It was also very evident on the hills at Chinley, on Rushop Edge near Edale, on all the high moors around Glossop, on Whittle Pike, Rossendale (Lancs), on the moors north of Heywood (Lancs), at Dunford Bridge (Yorks), in certain hilly parts of Cheshire bordering on Derbyshire, and in Westmorland. It is probable, therefore, that the area affected is nearly as extensive as that involved in the great outbreak in south-west Scotland in 1894.

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* Loc. cit., p. 75.

† *Report on injurious Insects for* 1894, pp. 13-14.

‡ *Handbuch der Pflanzen-krankheiten* by P. Sorauer, Vol. III, 1913, p. 369.

§ *Enumeratio Insectorum Norwegicorum : Lepidoptera*, p. 53.

‖ *Lepidoptera of the British Islands*, Vol. IV., 1897, p. 130.

¶ *Farm Insects*, p. 507.

** *Reports on Injurious Insects*, 1884, p. 16 ; 1894, p. 13 ; 1895, p. 19.

One or both of the writers visited the High Peak district on four occasions between 15th and 30th June, and examined the countryside from Chapel-en-le-Frith along Rushop Edge to Castleton, many of the moorland pastures around Glossop, and between Glossop and Hayfield. They found that the principal grass attacked was that known locally as " bent " grass (*Nardus stricta*), which forms much of the upland pastures at heights of 750 ft. and over. Cotton grass (*Eriophorum*) and other species appeared to suffer less severely. The infestation, furthermore, was noticeably more severe as the altitude increased. In fact, the presence of " bent " grass, and the altitude appeared to be distinct factors in the limitation of the infestation. The writers did not discover the caterpillar in any locality at an elevation less than 900 ft., but from that altitude up to 1,700 ft. it was prevalent. A remarkable feature was that the more succulent and finer grasses escaped ; couch grass was unattacked and no damage was observed to bilberry, white bedstraw, heather or bracken, even at the higher elevations. They found no trace of the larvæ having attacked the cultivated or better hill grasses, nor any corn crop, even when the latter were but a few yards away from badly-attacked areas of the coarser hill pastures. In one instance, larvæ were found in a meadow near Glossop. This meadow was a somewhat neglected one, and contained a large proportion of " bent " grass. On examination it was found that the latter alone suffered, all other grasses and vegetation in the same meadow remaining untouched. The damage committed to the upland grass areas was very severe, and bare, brown hillsides were characteristic features in the infested parts of the country. When kept in captivity the caterpillars will feed on various other grasses in the absence of " bent " grass.

Definite statements with regard to the food plants of this caterpillar are very scanty in literature.

We have the well-known assertion of Linnaeus that it will not touch *Alopecurus pratensis* and *Trifolium pratense*. Curtis* states that it feeds on all kinds of tender grass and that it eats away the roots and all shoots. Reuter† gives details as to the occurrence of this species in Finland, and as to its migration, when its ravages were complete in one place, to other grasses or crops; to oats, to a lesser degree to barley and occasionally to rye. According to Service‡ the plants most affected in south Scotland in 1894 were deer's hair (*Scirpus cæspitosus*), *Juncus articulatus* and *squarrosus*, bent grass (*Agrostis vulgaris*), blaw grass (*Molinia cærulea*), wire bent grass (*Nardus stricta*), hair grass (*Aira cæspitosa*), rough-stalked meadow-grass (*Poa trivialis*), Yorkshire fog (*Holcus lanatus*), and cotton grass (*Eriophorum vaginatum*). Almost all other writers simply record that it feeds on "various grasses."

The caterpillars were seen in the greatest abundance in the Glossop district, but from various reports it appears that they occurred in similar profusion in other places. At first sight they did not attract much attention, but a few minutes' observation showed that they were crawling in all directions over the moorland fields. They exhibited no definite migratory instinct. In some cases they appeared to be searching for fresh areas of grass; in others, they were moving through an abundance of suitable grass without stopping to feed thereon. When on slopes, they usually travelled downhill. Comparatively few caterpillars were seen actually feeding, and according to Barratt they "feed at night on the grass leaves, hiding away among the roots by day."

They moved with surprising rapidity, and when present in large numbers, a distinct rustle was faintly audible among the dry herbage of the hillsides. At one spot extending over some 300 yards in the Glossop-Hayfield main road, it was impossible to take a couple of footsteps without crushing one or more of the caterpillars, and vast numbers were killed by the wheels of passing traffic.

Barriers.—The two most efficient barriers were found to be water and stone walls. Roadside runnels and rivulets contained vast numbers of drowned caterpillars which had fallen from herbage and steep banks into the water. Stones and debris in the streams were covered with writhing caterpillars, crawling over one another in their efforts to escape from the uncongenial environment. Roadside horse-troughs also contained many hundreds of drowned individuals.

The stone walls, which form such a characteristic feature in the Peak District landscape, were also a moderately efficient barrier. These are built of stone slabs piled one on top of the other, leaving numerous crevices between. Great numbers of the caterpillars were to be seen on the ground at the bases of these walls. Most of them had fallen down in their efforts to surmount the latter. The caterpillars appeared to have little capacity for climbing the vertical faces of the stones. Furthermore, having attained a crevice in these loosely-built walls, they would crawl through if the opening were large enough freely to admit the light. On the other hand, if the crevices were small and dark, they were seen to turn back, thus exhibiting a marked response to the influence of light. On several occasions numerous caterpillars were noticed on both sides of the wall endeavouring to surmount the latter—evidently at a loss as to which direction to take.

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* *Farm Insects*, pp. 506-7.

† Quoted from Miss Ormerod's 1895 Report, p. 22.

‡ *Entomologist*, 1894, p. 280.

Possible Causes of the Outbreak.—The writers are of opinion that the wide distribution of the caterpillars is due to the extensive areas over which the moths cast their eggs, rather than to any special migratory instinct of their own. It appears that all the natural conditions of the past season have been advantageous to the pest. There is definite evidence from several sources that the plover has been exceptionally scarce this year over the affected areas. Starlings have likewise been less abundant. The exceptionally severe weather has, in all probability, caused a certain reduction of bird life in general. Furthermore, the hills were covered in snow for such an extended period that the young caterpillars were admirably protected from harm . even when the snow had disappeared the ground was so frozen that the reduced flocks of birds could not gain access to them. The absence of intermittent mild spells when birds make considerable inroads on insect life, was characteristic of the past winter.

The burning of the coarser mountain pasture growth, and adjacent heathland, has been largely at a standstill during the past two years, owing to the Defence of the Realm Orders as to the exposure of lights. Rather than run the risk of failing to extinguish the fires at the required time, farmers largely omitted this burning altogether. There seems little doubt that this custom of burning is an important factor in destroying the insect, whether in the egg or caterpillar stage of its life history, the firing usually taking place towards the end of March and the beginning of April. Finally, the long spell of dry weather afforded excellent conditions for the development and growth of the caterpillar, while the lack of moisture itself hindered the growth of the plant and emphasised the injury.

Preventive and Remedial Measures.—In the writers' opinion preventive or remedial measures only directly concern the upland grass areas. They found no evidence to warrant them in advocating any special measures to protect the good pastures or corn crops, that are thinly distributed over the affected areas. For the remainder of the present season, the only course open to the upland grazier is to remove his stock to other areas, or to utilise a proportion of his better meadow grass. With regard to milking cows, no other course is open. This procedure will entail buying some amount of hay for the winter feeding of stock. If, however, co-operation can be effected through the local Farmers' Associations, farmers with some amount of hay in excess of their own and the Army's needs, should sell to those whose meadows have had to be sacrificed to the exigencies of this present summer. If an arrangement of this nature be carried out there will be little need for farmers to dispose of their animals as has been advocated in one or two cases.

The writers are of the opinion that it might be found advantageous to cut permanent trenches, such as are described below, in a transverse direction across each upland pasture. Or, in the case of large unenclosed areas, a series of trenches. The sides of the trenches being vertical, it would take very little labour to trim these trenches up in any year when a severe infestation was threatened. It is true that where arable land is scarce, ploughs are not plentiful, but they could be borrowed or hired at times when they were in least demand for ordinary work. It may be argued, however, that the cutting of such trenches is scarcely worth while in view of the fact that outbreaks of Antler Moth caterpillars are few and far between. Whether this view be held or not, the writers strongly urge the necessity of a careful study of the correlation of insect outbreaks and weather conditions. After a severe winter, such as the last, it is advisable that due warning should be sent beforehand to farmers with regard to any pests that may reasonably be anticipated.

With regard to the pest at present under consideration, if such a warning were issued in time, it would be found more feasible to cut the trenches which the writers advocate directly the frost disappears, and before the caterpillars commence active depredation, rather than cut permanent trenches years beforehand. Such trenches were found to be one of the most effective methods of control in the case of the infestation of an allied Noctuid caterpillar known as the Army Worm [*Cirphus* (*Leucania*) *unipuncta*, Haw.], in the Dominion of Canada in 1914.* The trenches were cut by ploughing and were then dug out to a depth of 14 in.; the side of the trench away from the advancing caterpillars being trimmed vertical. Every 15 ft. along the trench post holes were dug 1 to 2 ft. in depth. When the caterpillars fell into the trench and were blocked by the vertical side, they changed their course until they reached a post hole. They fell into these post holes in large numbers, and were crushed at frequent intervals by men provided with blunt posts for the purpose.

In the case of the Antler Moth caterpillar, whose migratory instinct is less defined, it is recommended that both sides of the trench be trimmed so as to be quite vertical. By this means they will be effective in trapping caterpillars moving in two directions. Each trench need be no wider than is necessary to admit of its being dug out to the required depth, and a single trench to about every 15 acres of grass land should prove sufficient. If, however, it be deemed desirable during an infestation to protect any area towards which the caterpillars appear to be travelling, the side of the trench away from the advancing caterpillars only need be trimmed vertical, and a small amount of labour is thus saved.

As an alternative measure, poisoned bran has been used with success in Canada against the Army Worm. This bait was used in the form of a mash which was made up as follows :—

A. Three oranges or lemons were squeezed into 3½ gal. of water and their remains cut up finely and added thereto. In this was dissolved 2 qt. of molasses.

B. 20 lb. of bran were mixed dry with 1 lb. of Paris green.

A and B were then thoroughly stirred together in a tub, or other convenient receptacle, until a uniform damp mash was obtained. In Canada this mixture was scattered broadcast among the crops at the rate of about 6 lb. to the acre. In the case of the Antler Moth this method is scarcely feasible. The writers would suggest, however, that trials be made scattering the mash over a belt about 10 yd. wide between an affected area and the grass or crop it is desired to protect.

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* A. Gibson. *The Army Worm*. Bull. 9. Dept. Agric. Entom. Br., Ottawa, 1915.

The third method advocated in Canada was spraying with Paris green or arsenate of lead over a belt 20 yd. wide, comprising some kind of dense herbage, ahead of the advancing hordes of the Army Worm. It was found useless to spray herbage which was insufficiently thick to hold the poisoned wash. In using this remedy 1 lb. of arsenate of lead paste should be dissolved in 25 to 30 gal. of soft water. The writers however feel that this measure may not prove successful in this country. The object of the spray is to poison the food plants of the caterpillars, and the " bent " grass, which seems to be the commonest food plant of the Antler Moth, is not adapted to retain any considerable quantities of the wash.

The writers further advocate that the question of approaching the authorities for relaxation of the Order dealing with the exposure of naked lights should be fully considered. As the danger from hostile airships decreases, there seems little reason why these regulations should not be relaxed over the upland areas in question during the burning season.

Greater discrimination should be exercised in the preservation of bird life in these parts. As regards the control of this caterpillar, the value that accrues from the presence of rooks and starlings cannot be overestimated. The writers themselves have noted large flocks of these birds over heavily infested areas. The scarcity of the lapwing is a further factor in connection with the present infestation.

Finally, the writers would point out that the maxim " Prevention is better than cure " applies to the control of the Antler Moth as much as it does to that of many other insect pests, and would therefore urge the desirability of a careful study of the correlation between insect outbreaks and weather conditions throughout the country, and the establishment of a system by which farmers could be regularly warned in advance of the pests to be expected in any season.

AN INVASION OF THE CATERPILLARS OF THE ANTLER MOTH INTO YORKSHIRE.

JOHN SNELL

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A REPORT that there was a serious attack of caterpillars on the pasture land at Airton, Malhamdale, Yorkshire, was received by the Board on 13th June, and the district was visited on the 15th in order to ascertain to what extent the pest was prevalent and what damage was being done. Subsequently reports were received from Howes Junction, Bowfell, Garsdale, Tebay Fell, Slaidburn, Kirkby Stephen and Sedbergh, and it has since been reported from Threlkeld. It therefore seems probable that the caterpillars were present on practically all the mountain pasture lands from Derbyshire to Westmorland.

Extent and Intensity of Attack.—The damage done by the pest appears to have been confined entirely to the mountain pasture lands, and in no instance does it appear to have reached the meadow lands or the mowing grass. Early in May one or two farmers in the Airton district had noticed that some of their pasture still maintained a "brown, winter appearance" and that the sheep were being "starved," but it was only about the 1st June that they actually observed the presence of the caterpillars. The pastures which were first attacked were those near the tops of the Fell. On one farm alone on Scotsthrop Moor over 100 acres of mountain pasture was damaged to such an extent that practically no stock will be able to be carried for the rest of the summer. In this district there is practically no arable land, but the farmers were greatly alarmed lest the plague should spread to the better pastures and the meadow land in the valleys and on the lower slopes of the hills. The caterpillars were most abundant by the walls and along the small watercourses which intersect the pastures. At first, it was thought that this was due to the fact that in these situations there was probably a larger proportion of the harder and smoother grasses, but subsequent investigations indicated that the walls and the small streams acted as barriers to their progress. In the small stone folds thousands of caterpillars were trapped. The accompanying illustration shows the caterpillars accumulated in the corner of a field. Although there were many large holes in the wall they did not appear to pass through. Many of them can be seen endeavouring to climb up the walls, but it is very doubtful whether they actually passed into the dark crevices; in fact, the darkness seemed to stay their progress, caterpillars at the entrance to a hole being observed to hold their heads erect in order to find some means of avoiding it. Further evidence that the walls acted as a barrier was obtained by observations on two adjoining pastures below High Side. The pastures were separated by a wall with a gateway at one end, and though the one pasture was attacked early in the spring the adjoining pasture never showed any sign of attack except for a small patch round the gateway.

When the district was visited on the 15th June, which was a bright, sunny day, a large proportion of the caterpillars appeared to be migrating rather than feeding. The extent to which they were present was indicated by the large numbers which were trapped in holes and cavities due to drains having fallen in. In a single hole there must have been many thousands of larvæ. In the pools of one small stream there were larvæ lying in masses from 6 to 9 in. deep. These were decaying and the stench was very noticeable. In fact, all the small streams intersecting the invaded pastures were covered with a green slime due to the decay of large numbers of caterpillars which had been drowned. Mr. Cousins, who visited the Howes district, states that the caterpillars found their way into the wool of the sheep when they were lying down, and that consequently the sheep became very restless. The owner of the sheep stated that it had been necessary to move them to other pastures, but it seems probable that the sheep were restless owing to the lack of grass.

It was evident that the caterpillars were migrating down from the mountain pastures to the lower grass lands. The pest appears to move very rapidly, and it was noticed that on an average a caterpillar could travel at the rate of from 18 in. to 2 ft. per minute, which would mean that quite a long distance would be traversed in 24 hours. On Scotsthrop Moor they never reached the good pastures, but at Winterburn they came down lower. As stated above, the walls acted as barriers and thousands were trapped in the streams, rabbit holes and fallen drains, so that the damage done was much less on the lower slopes than on the tops of the fells. In no instance, however, did they reach the mowing grass or even the best lands.

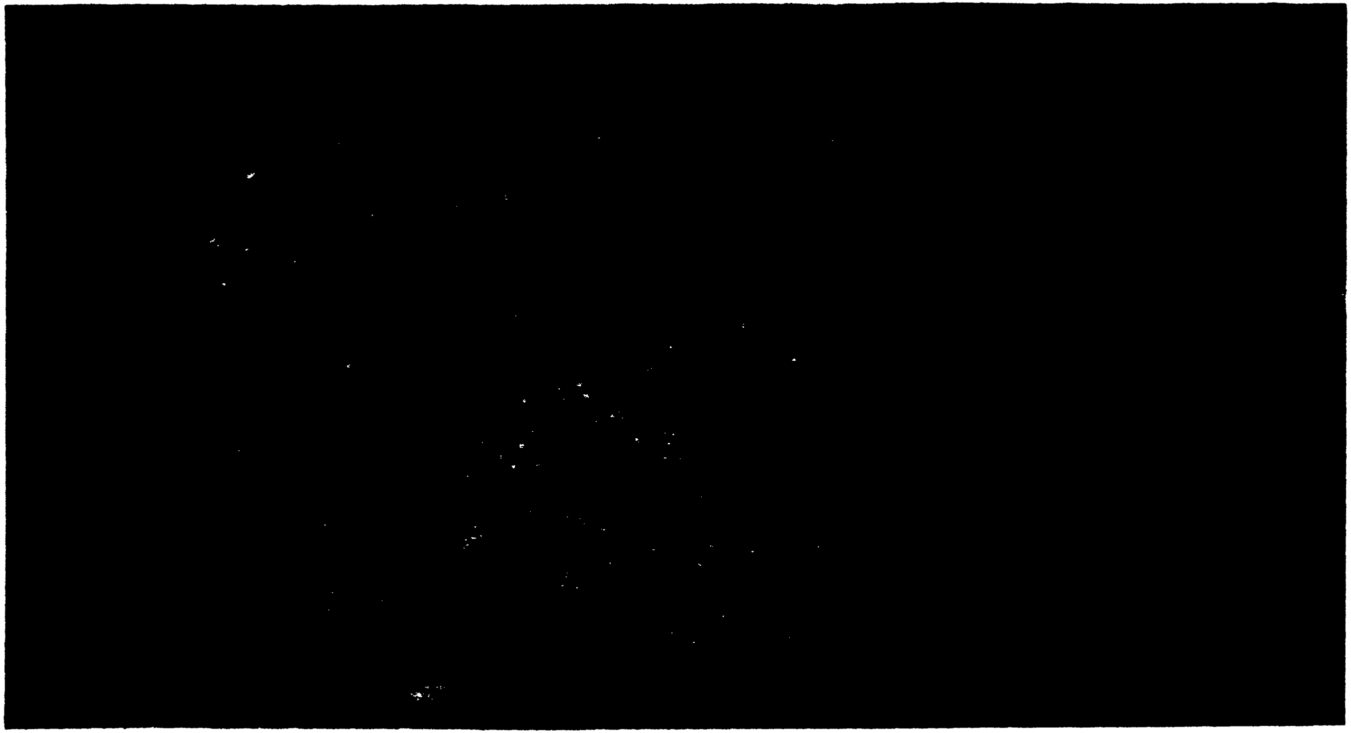

FIG. 1. Showing Caterpillars of the Antler Moth at the base of a stone wall.

Food Plants of the Caterpillar.—Careful observations were made as to the food plants of the caterpillars. Scotsthrop Moor was visited with Mr. Stapledon, who identified the grasses on which larvæ were actually observed to be feeding. These grasses were as follows :—

Tussock Grass (*Aira Cæspitosa*).—The young shoots of this grass must have been eaten early in the season, for in the pastures first attacked there were only the brown dead leaves of last year's growth.

Mat-grass (*Nardus stricta*).—Only one or two caterpillars were seen feeding on this species, but in those pastures where the pest was first observed only the brown dead leaves of last year's growth were present, and it was evident that the young shoots must have been eaten early in the season. In fact, the brown appearance of the attacked pastures was due to the fact that only the dead leaves of the mat-grass and the tussock grass were present. It might, perhaps, even be suggested that the moth lays its eggs in these grasses, which are the most prevalent grasses in the pastures attacked.

Sweet Vernal (*Anthoxanthum Odoratum*).
Sheep's Fescue (*Festuca ovina*).
Fiorin (*Agrostis alba*).

In addition to the grasses the caterpillars were also found to be feeding on the

Heath Rush (*Juncus squarrosus*),
Wood Rush (*Luzula*, sp. ?), and
Carex (sp. ?).

On Scotsthrop Moor, although a careful search was made, no caterpillars were observed to be feeding on any of the clovers or trefoils, but Mr. Cousins observed two of the caterpillars feeding on clover at Mallerstang.

Methods of Preventing Migration.—From the large numbers of larvæ trapped in pits and watercourses it was evident that a trench would prevent their advance. This was suggested to some of the farmers, and it was further suggested that the spraying of a belt with lead arsenate would act as a barrier. I am inclined to think that in those pastures surrounded by walls a trench or a sprayed belt would only be necessary at the gateways or wherever there were breaks in the walls. Mr. A. O. Blackhurst, of Southport, the chemist of the Sulphate of Ammonia Committee, visited the district with me in order to test the efficacy of some of the coal-tar waste products. We used some of the heavy, medium and light oils, and also an arsenical waste product obtained in the manufacture of sulphate of ammonia. All these substances certainly acted as contact insecticides. Wash oil killed the caterpillars in a few seconds, but the difficulty found in using this was that for

These potash salts condense in the cooler regions and pass up the furnace in the form of a fine dust. Owing to there not being sufficient air for complete combustion the particles become coated with carbon, and, together with a large quantity of particles of fuel, ironstone, etc., pass over with the gases into the " down-comer," or main down-flue. At the bottom of this flue is a cavity which retains the greater bulk of the dust (about 75 to 85 per cent.) in the form of a coarse, black powder. The finer particles, which contain the greater proportion of the potash salts, are carried on into the ovens or round boilers of the Lancashire type, where the gases, being combustible, are burnt, the heat produced being utilised in the production of steam for power purposes. The dust deposited in the ovens or round boilers is brick red in colour and somewhat finer than the black dust. The burnt gases issuing from the ovens carry with them the finest of the dust particles, and a further portion of these collects in the various flues, the gases and probably the finest particles of dust ultimately escaping by the stack. Many of the later-deposited flue-dusts are cream in colour and very bulky. They constitute the richest source of potash.

Composition of the Flue Dusts.—These potash-bearing flue dusts vary enormously in colour and composition—in fact the writer has not yet found two samples alike.

The black dusts contain, as one would suppose, considerable amounts of insoluble ferrous compounds. Insoluble sulphides are also present. Occasionally one meets with black dusts which contain soluble cyanides, sulphites, and even free alkali ; these should be avoided for agricultural purposes.

The red dusts are rich in ferric oxide, while many of the cream dusts contain either free lime or calcium carbonate. All are rich in silica and silicates.

The potash exists mainly as potassium sulphate with a smaller proportion of chloride, the remainder being in an insoluble form. The availability of the latter is a subject for urgent investigation. The amount of soluble potash varies very much ; in samples which the writer has examined the variation was between 50 and 70 per cent. of the total potash. After extracting the flue dust with hot water evaporation of the extract yields a white residue which contains on an average 70 to 80 per cent. potassium sulphate and chloride. Sodium chloride and calcium sulphate constitute the chief impurities in this water-soluble extract.

The following analyses of flue dusts will give some idea of the potash content of typical samples :—

Laboratory Number.	Colour.	Water-soluble Potash. per cent.	Total (acid-soluble) Potash per cent.
1493	Cream.	9·25	15·89
1502	Black.	—	3·13
1503	Red.	5·92	8·50
1504	Black.	1·68	2·97
1504B	Black (burnt).	—	5·12
1573	Black.	2·01	3·73
1590	Black.	1·23	3·13
1537	Cream.	5·69	11·82
1538	Red.	4·68	7·58
1539	Grey.	5·88	12·46
1566	Light brown.	3·82	7·51
1567	Grey.	4·70	7·10

Potash content of the salt obtained by extracting the flue dust with hot water.

Laboratory Number.	*Potash* (K_2O) *content per cent.*
1510	40·04
1523	41·27
1589	41·84
1632	39·74

Quantity Available.—It is difficult at present to give more than a rough approximation of the total amount of potash which could be obtained from this source, but the writer offers tentatively the following figures, which he is at present inclined to believe rather under- than over-estimate the quantity available :—

Number of furnaces in full blast in Great Britain	300
Quantity (in tons) of flue dust produced per furnace per week :—	
Black	20
Red	5
Cream	1

Assuming the Black to contain 2·5 per cent. potash,
,, Red ,, 7 ,, ,,
,, Cream ,, 10 ,, ,,

0·95 tons of potash per furnace per week would be produced. Each furnace would, therefore, yield about 50 tons of potash per annum, this giving for the 300 furnaces a total annual production of 15,000 tons. Of course this represents total potash of which all may not be available, but at least 50 per cent. of this would represent soluble potash.

The writer therefore considers this to be the most important source of potash yet discovered in this country. It is obvious that only a careful and thorough investigation into the whole question can result in the full benefit of these deposits being obtained for agriculture, but until arrangements can be made and plant erected for the extraction of the water-soluble potash salts, the raw flue dust might be utilised on land which must have become very deficient in potash during the past two years.

The writer wishes to express his best thanks to Mr. E. P. Davis of the Bennerley Furnaces, Ilkeston, for placing full facilities at his disposal, and to Messrs. Simpson and Rice for their valuable assistance, without which he would have been unable to obtain much of the information contained in this paper.

THE VALUE OF CIDER APPLES AND POMACE AS FOOD FOR FARM STOCK.

Professor B. T. B. BARKER, M.A., and B. N. WALE, B.Sc.

University of Bristol.

IN view of the present necessity for utilising every possible source of stock food, an experiment was arranged at the Seale-Hayne College, Newton Abbot, in conjunction with the Agricultural and Horticultural Research Station, Long Ashton, to determine the feeding value, if any, of cider apples and freshly-pressed pomace. It is estimated that on an average not less than 60,000 to 70,000 tons of pomace are produced annually in this country, and in the West of England pomace is fairly generally used for the feeding of stock on farms where cider is made. There is, however, a complete absence of any data on feeding trials from which its nutritive value could be deduced, and the only definite information bearing on the point is that furnished by analyses of this product. The composition of pomace has been dealt with recently in this *Journal*[*]; it was shown that freshly-pressed pomace is of distinctly higher feeding value than mangolds, and richer in carbohydrates though lower in protein than wet brewers' grains. The paper referred to emphasises the necessity of feeding it whilst it is still fresh and sweet, unless steps are taken to preserve it from decomposition ; methods of preservation are described.

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[*] See *Journal*, Vol. XXII, p. 851.

Even less is known with regard to the food value of cider apples. Before the War their use for stock feeding was not seriously considered, and was doubtless limited to the comparatively rare occasions when, owing to a glut of fruit, shortage of labour, or some other special reason, the crop was not gathered for cider-making. In such cases stock have been turned into the orchards to feed on the fallen fruit which they consumed with more or less relish and without harm provided that they did not over-feed.

During the cider-making season of 1916, since it was only practicable to conduct feeding trials on a limited scale, it was decided to confine them to pigs. The experiment was planned to determine the effect of substituting apples or pomace for a portion of the daily ration, and to obtain a qualitative rather than quantitative measure of their food value. In October, 1916, 20 pigs (Large Blacks and cross breds), varying in weight from 40 to 69 lb., were selected and distributed as equally as possible amongst 5 pens. Their rations throughout the experiment are given in Table I.

TABLE I.—*Daily Rations in lb. per Pen of 4 Pigs.*

Food	Pen 1				Pen 2.				Pen 3				Pen 4.				Pen 5.			
	Oct 18	Nov 15	Dec 13	Jan 10	Oct 18	Nov 15	Dec 13	Jan 10	Oct 18.	Nov. 15	Dec 13.	Jan 10.	Oct. 18.	Nov. 15	Dec. 13	Jan 10.	Oct 18.	Nov. 15.	Dec. 13.	Jan 10.
Apples ..	10½	20	21	—	5¼	10	10½	—	—	—	—	—	—	—	—	—	—	—	—	—
Pomace .	—	—		10	—	—	—	7½	—	—	—	—	8	4	3¾	5	4	6	6¾	5
Sharps ..	6¾	10¾	8	14	7⅞	12	9⅞	15	7⅞	13½	11¼	18	6½	12½	10	16	7⅞	11½	8	16
Maize meal ..	3⅜	3⅜	9⅜	9⅜	3⅜	3⅜	9⅜	9⅜	3⅜	3⅜	9⅜	9⅜	3⅜	3⅜	9⅜	9⅜	3⅜	3⅜	9⅜	9⅜
Fish meal ..	—	1⅛	2¼	—	—	1⅛	2¼	—	—	1⅛	2¼	—	—	1⅛	2¼	—	—	1⅛	2¼	—

Cider apples were introduced at the rate of 5¼ lb. per pen per day to Pen 1 and half that quantity to Pen 2. No difficulty arose in connection with the pigs eating the apples, and the quantity given was gradually increased to 10½ lb. and 21 lb., respectively, per pen per day by 1st December. To prevent choking, the apples were passed through a turnip cutter and mixed in with the meal and water from 14 to 20 hours before feeding; they never formed more than one-third to one-half by weight of the total food. The cider apples were home grown and valued at 30s. per ton.

Pomace was obtained at first direct from the National Fruit and Cider Institute and later from a local cider merchant, and was fed at the rate of 4 lb. per day to Pen 5 and 8 lb. daily to

Pen 4. For some unknown reason Pen 4 took the pomace with much greater difficulty than Pen 5, and the daily ration had to be reduced as low as 1 lb. by 16th November, and then gradually increased up to a maximum of 5 lb. per pen daily. On the other hand, Pen 5, commencing with 4 lb. daily, gradually increased its consumption to 10 lb. This was reduced on 10th January, to 5 lb. daily, because the pomace for the latter stages of the experiment was not quite fresh ; it had been put down in tubs in November at the time the local cider press ceased working for the season, and although it had been well consolidated when placed in the tubs, a certain amount of decomposition had set in and had made it less palatable to the pigs. The proportion of pomace in the ration varied from one-tenth to one-third of the total weight of food.

It is rather difficult to assess a satisfactory value for the pomace. In the present experiment the fresh pomace has been valued at 5*s*. per ton, which merely represents the cost of carriage. On most west-country farms the cost of the material to the farmer is nil, since it is obtained as a waste product in the course of cider-making. In fact, where it has not been used for stock feeding it has been regarded rather as a nuisance ; but recently, owing to the introduction of drying plant for dealing with it on a large scale, pomace has been recognised as a useful ingredient in compound cattle foods, and its market value is likely to increase before long.

Sharps or middlings were fed to each lot of pigs over the whole period, the quantity varying according to the amount of apples and pomace fed and increasing as the pigs got heavier. Substitution was made at the rate of about 5 lb. apples or 2½ lb. pomace for 1 lb. of sharps. The sharps cost £11 17*s*. 1*d*. per ton.

Maize meal was gradually increased from 3¼ to 9¾ lb. per pen per day, and was obtained in two consignments costing £13 4*s*. 4*d*. and £16 12*s*. per ton respectively.

Fish meal was fed about a fortnight after the experiment commenced at the rate of ½ lb. per pen daily. This was increased to a maximum of 2½ lb. daily per pen by 1st December, and was continued until 16th December, after which it was discontinued altogether, so that there should be a period of at least one month's feeding without fish meal before the pigs were slaughtered. The fish meal formed on the average about one-ninth of the total meals fed, and cost £11 15*s*. per ton.

All the foods used in the experiment were analysed and their composition is set out in Table II.

TABLE II.—*Composition of Foods Used.*

—	Apples.		Pomace.		Sharps.	Maize Meal.	Fish Meal
	1	2	1 Long Ashton.	2 Newton Abbot.			
	Per cent	Per cent	Per cent.	Per cent	Per cent.	Per cent.	Per cent.
Water	83·8	83·0	67 20	71·75	15·70	14·20	14·9
Protein	·7	·5	1·90	1·70	15·33	9·53	49·1
Fat	·4	·3	1 47	1·05	4·86	4·08	8·6
Crude fibre	1·2	2·6	13·70	12·22	21·80	2·20	4·3
Carbohydrates ..	13·3	13·2	15·17	11·78	38·72	68·66	3·5
Ash	·6	·4	·56	1·50	3·59	1·33	19·6

The composition of the apples and pomace was naturally subject to considerable variation, according to the source of supplies and to the condition of the material. The two samples of pomace were taken from the material actually used in the experiment ; but, owing to the difficulty of obtaining representative samples of the sliced apples, the figures given for the apples are not the result of direct analysis. The first set of figures is based on an analysis of apples by Henry, and the second gives calculated values for the apples which furnished the pomace sample No. 1.

The experiment may be divided into two periods—

I. From 5th October to 15th December, during which both apples and pomace were used.
II. From 16th December to 15th January, during which only pomace was used.

At the end of Period II. the pigs were slaughtered and their carcass weights were determined. In order to obtain comparative carcass weights for the end of Period I., it was estimated that the carcass weight on 15th December was 2 per cent. lower in every case than it was on 15th January, as follows :—

	Percentage of Carcass to Live Weight at end of Period II.		*Calculated Percentage of Carcass to Live Weight at end of Period I.*
Pen 1	72·93	− 2 =	70·93
„ 2	73·17	− 2 =	71·17
„ 3	73·77	− 2 =	71·77
„ 4	74·44	− 2 =	72·44
„ 5	74·23	− 2 =	72·44

In Table III. are set out the experimental results for Period I.

TABLE III.—*Experimental Results for Period I.*

—	Fasted Live Weight.		Gain in Live Weight in 71 Days.	Calculated Carcass Weight.	Food Consumed.						Total Meal Consumed per lb. Live-Weight Increase.
	At Start.	At end of Period I.			Apples.	Pomace.	Sharps.	Maize Meal.	Fish Meal.	Total Meals.	
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Pen 1 i.	63	139	76								
ii	44	87	43								
iii.	56	146	90								
iv.	51	142	91								
Total	214	514	300	364·59	1,142	—	547	390	91	1,028	—
Pen 2 i.	60	134	74								
ii.	46	121	75								
iii.	56	147	91								
iv.	51	125	74								
Total	213	527	314	375·06	570	—	669	390	91	1,150	3·66
Pen 3 i.	56	132	76								
ii.	60	156	96								
iii.	52	152	100								
iv.	43	115	72								
Total	211	555	344	398·32	—	—	771	390	91	1,252	3·64
Pen 4 i	54	118	64								
ii	64	155	91								
iii.	54	137	83								
iv.	40	104	64								
Total	212	514	302	372·34	73	251	652	390	91	1,133	3·75
Pen 5 i	44	88	44								
ii	69	158	89								
iii.	51	130	79								
iv	49	144	95								
Total	213	520	307	376·68	35	355	614	390	91	1 095	

From a consideration of the live-weight gains it will be seen that Pens 1 and 5 each contained a pig which did less well than any other pigs in the experiment, their gains being 43 and 44 lb., respectively, while other pigs of similar size made gains of about 70 lb. Obviously, therefore, these pigs did badly owing to individual defects. There is no doubt they ate less food than the other pigs of their respective pens; consequently the remaining three pigs of these pens had a larger available food supply than the corresponding pigs in the other three pens. On this account it is perhaps advisable to cut out entirely the results obtained from Pens 1 and 5 and consider only those from Pens 2, 3, and 4.

Table IV. gives the financial results of Period I. assuming that the pigs were worth 18*s.* per score at the end of that period, and calculating their carcass weights as shown above. Nothing is charged on the one hand for labour and straw for bedding, nor on the other hand has anything been allowed for the value of dung produced. These two items are generally taken to balance one another.

Pen 3, the "meal only" pen, made the most profitable increase and further, the effect of substituting apples or pomace for part of the meal was to reduce the gain from the meal consumed. It should not be overlooked, however, that the substitution of apples and pomace for meal materially altered the nutritive balance of the ration, resulting more particularly in a considerable decrease of protein and fat. Moreover,

TABLE IV.—*Financial Returns for Period I.*

—	Market Value of Pigs at Start	Cost of Food.						Cost of Pigs plus Cost of Food	Value of Pigs at 18s. per score.	Balance per Pen.
		Apples.	Pomace	Sharps	Maize	Fish Meal	Total			
	£ s d	£ s d	£ s. d	£ s d	£ s d	£ s d	£ s d	£ s. d	£ s. d	£ s. d
Pen 2 i	1 18 8									
ii	2 3 0									
iii	1 16 0									
iv	1 16 0									
Total	7 13 8	0 7 7	—	3 11 11	2 4 4	0 9 7	6 13 5	14 7 1	16 17 6	2 10 5
Pen 3 i	1 18 8									
ii	2 3 0									
iii	1 16 0									
iv.	1 16 0									
Total	7 13 8	—	—	4 1 10	2 4 4	0 9 7	6 15 9	14 9 5	17 18 6	3 9 1
Pen 4 i	1 18 8									
ii	2 3 0									
iii	1 16 0									
iv	1 16 0									
Total	7 13 8	0 1 0	0 0 7	3 9 0	2 4 4	0 9 7	6 4 6	13 18 1	16 15 1	2 16 11

Pen 3 made exceptionally good gains, and had it required, say, 4 lb. of meal instead of about 3½ lb. to produce 1 lb. live-weight increase, then the apples and pomace would have made a far better showing.

As the apples were nearly finished and no further supply was available for Pen 2 after 15th December, they were first reduced and then entirely replaced by pomace on 18th December. In Tables V. and VI. are given the experimental results for Period II., and the financial returns for that part of the experiment. The pigs were bought by the Totnes Bacon Factory, and the average price per score on the whole of the pigs sold was 19*s.* 2¼*d.* It will be seen that the differences in the cash returns between the three pens were not very appreciable and, further, that the pomace-fed pigs gave a very satisfactory live-weight increase in Pen 4, *i.e.* 159 lb. against 158 lb. for the "all-meal" pigs in Pen 3. Also in Pen 2, which only made an increase of 144 lb. live weight, the cost of the food was about 9*s.* less than in Pen 3.

TABLE V.—*Experimental Results of Period II.*

—	Fasted Live Weight.		Gain in Live Weight in 30½ Days.	Actual Carcass Weight.	Food Consumed.			
	At Start.	At end of Period II.			Apples.	Pomace.	Sharps.	Maize Meal.
	lb.	lb.	lb.	lb	lb.	lb.	lb.	lb.
Pen 2 i.	134	173	39	121				
ii.	121	152	31	111				
iii.	147	179	32	139				
iv.	125	167	42	120				
Total	527	671	144	491	9	220	425	302
Pen 3 i.	132	174	42	121				
ii.	156	192	36	147				
iii.	152	193	41	142				
iv.	115	154	39	116				
Total	555	713	158	526	—	—	515	302
Pen 4 i.	118	157	39	115				
ii.	155	191	36	147				
iii.	137	183	46	136				
iv.	104	142	38	103				
Total	514	673	159	501	—	151	454	302

It would seem, therefore, that in the later stages of fattening, when a pig has reached 5 scores, pomace is a useful article of diet used at the rate of 2 to 3 lb. per head daily, and, provided the pomace has been carefully consolidated when taken from the press, it can be used satisfactorily even if 1½ to 2 months old.

In supplementary trials which it is hoped to carry out in succeeding seasons, an attempt will be made to ascertain more nearly whether it is more profitable to use the apples themselves or the pressed pomace obtained from them after cider-making. So far as the present trial goes, it seems that the fruit could be utilised to best advantage by first pressing it for cider-making and then using the pomace as stock food.

Finally, it may be pointed out that although the experiment as arranged afforded a means of comparing these materials with sharps for feeding purposes, it is not suggested that they should

TABLE VI.—*Financial Returns for Period II.*

—	Value of Pigs at Start.	Cost of Food.						Cost of Pigs plus Cost of Food.	Value of Pigs at 19*s.* 2½*d.* per score.	Balance per Pen.
		Apples.	Pomace.	Sharps.	Maize.	Fish Meal.	Total.			
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pen 2 ..	16 17 6	0 0 2	0 0 6	2 4 11	2 4 9	—	4 10 4	21 7 10	23 11 4	2 3 6
Pen 3 ..	17 18 6	—	—	2 14 6	2 4 9	—	4 19 3	22 17 9	25 4 11	2 7 2
Pen 4 ..	16 15 1	—	0 0 4	2 8 1	2 4 9	—	4 13 2	21 8 3	24 0 11	2 12 8

be regarded in any sense as complete alternatives for the latter. The protein and fat contents of the latter so far exceed those of the former that a fair comparison could not be made without the addition of protein and fat to the fruit ration.

Conclusions.—One is not justified as the result of a single experiment in drawing definite conclusions. Further tests are necessary, but the above results appear to indicate that, while for fattening pigs weighing not more than 55 to 60 lb. per head neither cider apples nor pomace give as satisfactory results as meal alone, both these foods possess a distinct feeding value for older pigs and store pigs.

PROCEEDINGS IN 1916 UNDER THE TITHE, COPYHOLD, COMMONS, AND OTHER ACTS.*

Tithe Acts, 1836 *to* 1891.—The value of £100 tithe rent-charge for the year 1917 is £92 1s. 0¼*d*., whereas its value for the year 1916 was £83 2s. 6¾*d*.

Tithe rent-charges amounting to £1.272 in respect of a total area of 4.523 acres were extinguished by declarations of merger. Tithe rent-charges and extraordinary tithe amounting in all to £1,160, in respect of a total area of 8.791 acres, were extinguished by redemption.

The following table gives particulars of redemptions of tithe payments, and mergers of tithe rent-charge :—

Nature of Tithe Payment.	Applica-tions Received	Cases Completed.		Cases in Progress on 31st Dec., 1916.
		No.	Amount of Annual Charge.	
			£	
Tithe Rent-charge	181	257	1,158	299
Corn Rents payable under Local Inclosure Acts ..	6	10	80	5
Extraordinary Tithe ..	5	4	2	1
London (City) Tithe Rate ..	7	5	52	6
Vicar's Rate in Halifax ..	3	3	8	—
Mergers of Tithe Rent-charge	67	62	1,272	21

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* As a measure of war economy, this Annual Report is not being issued separately in its usual form. For the 1915 Report, see this *Journal*, Vol. XXIII., p. 123 ; for the 1914 Report, see Cd. 7916.

Altered apportionments of tithe rent-charge and other tithe payments were as follows :—

Nature of Tithe Payment.	Applications Received.	Cases Completed.	Cases in Progress on 31st Dec., 1916.
Tithe Rent-charge	138	212	200
Corn Rents payable under Local Inclosure Acts	—	2	3
Extraordinary Tithe	5	6	17

Three applications were received for the Board's sanction of the exchange of glebe for other land. Four exchanges were completed, and one was in progress on 31st December. One exoneration of land from extraordinary tithe was received and completed in the year.

Fees amounting to £2,797 were received in respect of business under the Tithe Acts.

Copyhold Act, 1894.—The Board received 103 applications for enfranchisement, and completed 107 cases. of which 28 were voluntary and 79 were compulsory. while 38 cases remained in progress at the end of the year. The total consideration for the completed enfranchisements comprised capital payments amounting to £6,201, and annual rent-charges amounting to £84 13*s*. 4*d*.

Two enfranchisement rent-charges, amounting in all to £68 15*s*. 6*d*., were redeemed.

Fees amounting to £318 10*s*. were received in respect of business under the Copyhold Act.

Conveyancing and Law of Property Act, 1881.—Two redemptions of rent-charge under Section 45 were completed in the year 1916. A total of 62 redemptions in all have now been effected under this section.

Commons Act, 1899.—A scheme was approved by the Board for the regulation of Ewhurst Green (about 11 acres in area) in the county of Surrey.

Commonable Rights Compensation Act, 1882.—In respect of a sum of £620 paid by the Lancashire Territorial Association as compensation for the extinguishment of common rights over a portion of Holcombe Moor, Lancashire, the Board made an Order directing trustees to apply the money to the improvement of the herbage and the repair of the roads and fences.

Inspection of Maps and Documents.—The reduced fee of 1*s*. which had for several years been charged to the public for the inspection of certain public documents deposited with the Board at 3, St. James's Square, was, as a war measure, restored to its original amount, viz., 2*s.* 6*d.*, as from the 1st January; and the hours during which inspections can be made were restricted to the mornings of each week-day in consequence of the depletion of the Board's staff. An average increase of 50 per cent. on the charges for the supply of copies and extracts from these documents and tracings of any maps relating thereto came into operation in June.

THE CANNING OF FRUIT AND VEGETABLES.*

The importance of preserving the largest possible quantity of vegetable food for winter use is recognised by everybody. In the case of fruit the importance is all the greater, insomuch as there is reason to expect that the amount of jam produced this year and available for civilian consumption will be less than in normal years. Moreover, in the absence of sufficient supplies of sugar, household jam-making cannot be practised on so large a scale as usual. Therefore, it is to be hoped that everyone who has or can obtain fruit will preserve as much as possible. There are four ways in which this can be done:—

By jam-making with sugar or with sugar substitutes (for example glucose and corn syrup). drying, bottling and canning.

It is the object of this pamphlet to describe methods of canning suitable for use by those who grow or are able to obtain in their neighbourhood plentiful supplies of fruit and vegetables.

The Advantages of Canning.—In both bottling and canning, fruit and vegetables are preserved by heat-sterilisation—that is to say, the germs of decay present in the material to be preserved are destroyed by heat, and the fruits or vegetables thus sterilised are sealed in glass or tin vessels so that no germs can reach them from the outer air. The difference between the processes of bottling as ordinarily practised and canning lies in this, that in bottling, sterilisation is brought about by the heat of boiling or nearly boiling water, whereas in canning it is effected by live steam.

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* Issued in the form of a Leaflet by the Food Production Department of the Board, to whom all inquiries should be addressed (72, Victoria Street, London, S.W. 1).

Inasmuch as bottles are easily cracked by a sudden rise in temperature, bottling must be done somewhat slowly; but the use of cans made of " tin " enables the canner to deal much more quickly with the material to be preserved, and canning is, therefore, recommended for those who wish to preserve large quantities of fruit or vegetables.

Although canning is practised on a commercial scale in this country, it has not hitherto been adopted generally by amateurs or small fruit growers. This is the more surprising in that canning is a method which has become very popular on the farms and homesteads of America.

One of the most successful small canning plants in use in America is that known as the " Royal Home Canner," an apparatus first introduced into this country by the late Mr. R. A. Yerburgh. Early in the present year the Agricultural Organisation Society drew the attention of the Food Production Department to this apparatus, and when it found that, owing to transport difficulties, it was impossible to import the " Royal Home Canner " in time for use this year, arrangements were made with the firm of Messrs. Brierley, of Manchester, for the manufacture of an apparatus modelled on the " Home Canner." Tests with the canner made by this firm having proved satisfactory, the Food Production Department approached the representatives of the American Government in this country and asked them if they might with propriety manufacture the apparatus here. A favourable answer having been received, orders were placed for the manufacture of several hundred canners of the " Royal Home Canner " type.

The canners, a consignment of which will be ready in the first week of August, may be purchased from the manufacturers through the Food Production Department.

Description of the "Royal Home Canner."—The apparatus is made of galvanised iron and consists of the following parts :—

(1) A covered boiler or steriliser with a device for the rapid generation of live steam.
(2) Trays.
(3) A grate for coke, coal or wood fuel.
Instead of these fuels, gas or an oil stove may be used for generating the steam.

The apparatus is readily portable and may be used in the orchard, thereby saving time and labour in the handling of fruit.

NOTE.—When about to be used and before the fire is lit, sufficient water must be placed in the steriliser to cover the bottom to a depth of from 3 to 4 in.; this depth of water must be maintained throughout the time of use.

The construction of the steriliser is such that the heat from the stove generates live super-heated steam which is distributed evenly throughout the steriliser. It is to the rapid production of steam that the efficacy of the apparatus is due.

Capacity.—The capacity of the canner is such that it takes at one charge 36 quart or 56 pint cans. Or, if preferred, the lower tray may carry cans and on the upper tray 28 2-lb. glass jars may be placed instead of cans. Tests made by the Food Production Department show that if reasonable care is taken and if the instructions given later (see p. 544) are followed, glass jars may be used on the upper tray without undue risk of breakage. This course is convenient when it is desired to make use of bottles as well as cans for preserving fruit and vegetables at the same time. In that case the vegetables (which take longer than fruit) are placed in the cans and the fruit is placed in bottles.

Time for Sterilising.—The time required for sterilising fruit is from 15 to 20 minutes; for vegetables it is longer (see p. 545).

Allowing two charges per hour, *upwards of 600 quart cans of fruit may be prepared in the course of a day.* Hence the apparatus should prove of the utmost use in fruit-growing districts, and, especially if owned and used co-operatively, it should enable societies or groups of individuals to prepare large supplies of preserved food.

Special Features.—The apparatus is—(1) portable, (2) economical of fuel, (3) rapid in action, (4) of large capacity, (5) adaptable to many uses besides canning. The products retain their colour and flavour and are of excellent quality.

Price.—The price of the canner with stove and accessories is £6 10*s.*, carriage paid.

Cans.—Arrangements have been made to supply purchasers with cans (2 lb. or 3 lb.) in 1 gross or 5 gross packages, up to the number of 10 gross.

The cans to be supplied are specially lacquered on the inside, so that the fruit or vegetables are prevented from coming in contact with the tinned surfaces. Thus the principal objection to the use of cans is removed.

Price of Cans.—English, 2 lb. size, per 1 gross, 35*s.* 6*d.*; per 5 gross, 33*s.* 6*d.* American, 3 lb. size, per 1 gross, 45*s.* 6*d.*; per 5 gross, 43*s.* Delivered in non-returnable crates.

Instructions in Canning.—For the benefit of those who are within reach of London, daily demonstrations, which will continue up to the middle of August, are being given at the Food Economy Exhibition, L.C.C. New County Hall, Westminster.

Instructions in the Country.—Purchasers of a canning plant may receive free instructions in its use on application to the Food Production Department. This application should be made when ordering the canning plant.

Canning.—Canning consists of two essential operations :

1. *Exhausting air from the cans.*

Exhaustion is effected in the following way: A can in which the fruit has been placed is filled with hot water and the lid (or cap) is soldered on. Meanwhile, the hot water has caused the air in the can to expand and hence some of the air is drawn out through the small vent hole in the middle of the lid.

If cold water is used to fill the cans exhaustion must be effected by placing each can after the lid has been soldered on in the steriliser for a short space of time—from 3 to 5 minutes.

2. *Cooking or Processing.*

The fruit or vegetables are sterilised by the operation known as cooking or processing. After the air has been exhausted the opening is closed or "tipped" by means of solder. The can is now hermetically sealed and ready to go back into the steriliser for cooking (processing).

Instructions.—1. *Cleaning the cans.*

Remove the dust by rinsing the cans with clean water.

2. *Filling.*

Fill them with fruit or vegetables. Shake the contents down and add hot water to within one-quarter to one-eighth of an inch of the top.

Work Table.

The work table on which the tins are to be soldered must be *perfectly level.* This is essential because the water (or syrup) in the cans must not touch the lid about to be soldered.

3. *Tinning the tools.*

The soldering iron must be "tinned" before use, otherwise the solder would not run smoothly.

First see that the copper of the soldering iron is bright and that the tip is not blunt, and if necessary lightly polish the copper with emery cloth or with a file. Heat the iron to a point at which solder applied to it melts instantly (*the soldering iron must on no account be red-hot*).

When heated to the right temperature, place the soldering iron quickly in the soldering fluid, touch the end of it with the solder and again dip the iron into the fluid when the solder will be found to run evenly over the surface of the " iron." Repeat these operations until the copper is coated evenly with solder. It is now tinned and ready for use. If the iron is too hot the solder flies from the surface ; if too cool the solder does not melt

Practice in putting on lids.—Partly fill a cup with soldering fluid. Have ready a heavy damp cloth with which to wipe the edges of the soldering iron.

Place the lid on an empty can. By means of a brush or swab apply the fluid sparingly to the surface to be soldered, and by means of the soldering iron run in the solder so as to seal the lid.

Needless to say, the inexperienced should, if possible, get a tinsmith to show them how to solder.

4. *Putting on the lid.*

After the can has been filled, wipe the top dry and fit the lid on the opening. Hold the lid in place whilst applying the soldering fluid to the parts of the can and lid which have to be soldered. Tack the lid on to the can by melting, by means of the iron, a little solder at one point. Hold the lid firmly in place by means of a stick, tack at several points and then run the solder quickly all round the edge of the lid.

5. *Tipping the can.*

To close the vent hole in the middle of the lid, hold the soldering iron so that its point presses against the hole and touch it with the solder until enough melts to fill the hole. Always after finishing soldering wipe the surface with a wet cloth, to remove any fluid and to polish the solder. Remember the advice as to the need for a clean and pointed soldering iron and as to the temperature of the iron. Before using the iron wipe it with a damp cloth and dip its point in the soldering fluid.

6. *Testing cans.*

After they have been tipped, the cans should be tested. Immerse in hot water. A leak may be detected by the appearance of small air bubbles coming from the defective place. It must be stopped by soldering

7. *Processing (Cooking).*

The essential operation of canning consists in sterilising the contents of the cans by exposing them to the steam in the steriliser, and is done after the can has been hermetically sealed.

The lengths of time necessary for processing different fruits and vegetables are given in the recipes which follow.

8. *Preventing the rusting of cans.*

Cans must be kept dry and stored in a dry place. The surface of the cans may be lacquered. If labels are used, only the exposed tin surface need be lacquered. The lacquer must be applied by means of a brush before the cans get cold. Before lacquering make sure that the surface of the cans is dry.

10. *Cooling the cans.*

To stop cooking after the cans are removed from the steriliser, plunge them into cold water.

To Use Glass Jars for "Canning."—With proper care, ordinary screw top, rubber ring, glass jars may be used with the "Home Canner." The rubber rings should be good and springy; old and hard rubber is the cause of many failures, both in bottling and in canning.

Glass jars, containing the fruit and vegetables, must be filled cautiously with hot water; the rubber ring and top must be placed in position and the top screwed on, but not quite tightly. The jars are then put in the steriliser and allowed to remain rather longer than is needed for cans. When taken from the steriliser the tops must be screwed tight and the jars allowed to cool gradually, and should not be placed in a draught or in cold water.

Breakage, due to the glass jars knocking against one another, may be prevented by enclosing them separately in string or canvas bags.

Recipes.—The length of time and the temperature for sterilisation are different for each kind of fruit or vegetable.

Fruits require a shorter time than vegetables, and acid fruits less than others.

The times given in the following recipes are those required for pint or quart cans; gallon cans require double time; glass jars require considerably more time than cans.

For canning, all fruits must be picked whilst dry.

Apples.—Any variety of firm, late apple may be canned. Pare, slice or quarter, remove core and cover immediately with cold water to prevent discolouration. Fill the tins or jars with the fruit, add hot water, solder on the lid, seal the tip and put the cans in the steriliser for from 10 to 15 minutes according to the ripeness or hardness of the fruit.

Blackberries.—Remove leaves and stems; wash carefully to get rid of dust; pack tightly in cans, add hot water or syrup. Cap, tip and process for 10 minutes. If glass jars are used, process in steam for 20 minutes.

Cherries.—All varieties may be canned, but the Morello and other cooking varieties are best. The fruit may be stoned or canned whole. Pack the fruit in cans or jars, cover it with hot water or syrup made by boiling together equal quantities of sugar and water, cap and tip. For each 2-lb. tin process in steam in the steriliser for 15 minutes.

Gooseberries.—Green Gooseberries can well in water but not in syrup. If syrup is used the fruit should be firm and nearly ripe. Wash, tip and tail; fill the cans, cover with hot water. Cap, tip and process in steam for 15 minutes.

Pears.—The fruit should be ripe but not soft. Cut in halves, peel and core. Sweet varieties should be covered with hot water, capped and tipped, and process for 15 minutes; hard varieties should be covered with hot water or syrup and capped, tipped and process in steam for 20 minutes.

Plums.—Any varieties may be canned. The fruit should be well coloured but firm. Wash and pack in cans; cover with hot water. Cap, tip and process in steam for 20 minutes.

Raspberries.—Remove the stalks. Fill the cans and cover the fruit with hot water or syrup. Cap, tip and process in steam for 15 minutes.

Red Currants.—Remove the stalks. Wash, pack tightly in cans, cover with hot water or syrup. Cap, tip and process in steam for 10 minutes.

Strawberries.—Strawberries should not be washed. Process in steam for 10 minutes.

Vegetables.—All the ordinary kinds of vegetables may be canned, but they need more time than fruits. The times which are given in the following recipes provide for the proper cooking of the vegetables. If the vegetables are not sterilised for a sufficient time they will not keep.

Scalding or Blanching.—Some vegetables require scalding (blanching) before canning, and for this purpose a large kettle of boiling water should be kept at hand. The scalding may be done in a wire basket, or in a bag made of common cheese cloth.

For the best results the scalding should be well done. Blanching softens the vegetables and also assists in the sterilisation. If it is neglected the canned vegetables are apt to be hard. This applies to peas as well as to certain other vegetables referred to below.

Cold Dip.—Immediately after scalding or blanching, dip the vegetables into cold water. This helps to preserve the colour; for example, if runner beans are scalded for 2 minutes and dipped in cold water, the ultimate product is of a good green colour. The cold dip also helps to prevent the canned vegetables from becoming too soft.

Asparagus.—Select new, tender stalks; cut into lengths to fit the cans. Wash thoroughly and blanch for 3 minutes. Dip immediately into cold brine (4 oz. of salt to a gal. of water). Pack into cans; cover with hot water; add a small spoonful of salt. Cap, tip and process in steam for 60 minutes or longer if the stalks used were not tender.

Beans.—Broad Beans.—Use beans not too ripe. Shell the beans and wash them in cold water; blanch for 15 minutes or for 10 minutes if the beans are very tender. Pack them in cans, but since beans swell, do not fill the cans too full. Add a small tablespoonful of salt; an equal amount of sugar. Cap, tip and process in steam for 60 minutes.

Runner Beans.—Wash, remove the strings and tip the ends, or cut into small pieces about an inch in length. Blanch for 2 minutes in boiling water; plunge into cold brine as for asparagus. Pack in cans, add a small spoonful of salt; cover with hot water. Cap, tip and process in steam for 60 minutes.

Carrots.—Select young tender carrots. Wash and scrape. Blanch in scalding water for 5 minutes. Slice or pack whole in cans or bottles; cover with hot water. Cap, tip and process in steam for 60 minutes.

Peas.—Shell, blanch the peas for about 4 minutes, till they begin to wrinkle. Pack them in cans; fill with water. Cap, tip and process in steam for 90 minutes. Salt and sugar may be added to the water and also an infusion of mint. To a pint of hot water add a lump of sugar and a small spoonful of salt and leave a sprig of mint in the water for 2 minutes. Pour the liquid over the peas in the cans.

Tomatoes.—Choose tomatoes of even size. Place them in the scalding tray and dip into boiling water from 30 to 60 seconds. Transfer immediately to cold water. Remove the skin and core, but if possible keep the tomatoes whole. Put them into cans and to each quart can add 2 teaspoonfuls of sugar and salt mixture. Cap and lower the cans into the steriliser and exhaust for 3 minutes in live steam. Take the cans out, tip and process them in steam for 20 minutes.

If glass jars are used, fill them with uniform, ripe, red, whole tomatoes, and process them in steam for 40 minutes. Test the jars by submerging them in the water and examine them after a few days to see that there has been no leakage. If air bubbles begin to rise, put the jars into the steriliser and re-process for about 5 or 10 minutes.

The sugar and salt mixture referred to above, consists of 2 cupfuls of sugar and 1 cupful of salt mixed well together.

Vegetable Soup.—Mixtures with vegetables to be used for soup may be canned. Each vegetable must be prepared as for canning, *e.g.* mix well—tomatoes, 2 parts; other vegetables, 1 part. Pack in cans whilst cold and add one large slice of onion to each can. Cap and exhaust for 3 minutes. Tip and process in steam for 1 hour.

NOTE.—After lowering glass jars into the steriliser for processing in steam, do not put on the cover of the steriliser for a few minutes, for if the cover is replaced immediately, the temperature will rise so rapidly as to cause the glass to crack.

Fruit and Vegetable Drying.*

THE thrifty will find in the practice of drying fruit and vegetables a useful means of increasing the winter food supply. After the last meal of the day has been cooked, the heat of the oven, instead of being wasted, may be used to dry the surplus vegetables of the garden or allotment and so to prepare a store of winter food.

For drying on a small scale, one of two means may be employed:—

(1) In small drying machines.
(2) In the kitchen oven.

Drying Machines.—There are on the market several types of drying machines, such as Gnome, Invicta, Lightning, and British Evaporator. The chief advantage of a drying machine over the kitchen oven lies in the fact that such vegetables as carrots, turnips, parsnips, which require to be boiled or steamed before drying in the oven, may be dried in the drying machine without previous cooking.

Potatoes, whether dried in the drying machine or in the oven, must first be lightly cooked, preferably by steaming.

Instruments for peeling, coring and cutting may be obtained of the vendors of drying machines, but although essential for large quantities they are not necessary for use in oven drying.

Drying in the Oven.—Drying trays may be purchased ready made or may be constructed by nailing together in a square four wooden laths, and stretching wire gauze or canvas across the framework.

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* Issued in the form of a Leaflet by the Food Production Department of the Board.

Drying must be done only in a moderately warm oven. After the oven has been used for cooking take out the oven shelf, put in the drying tray with its charge of fruit or vegetables, and leave it all night, repeating the drying again on the next evening if the material requires it.

Instructions for Drying.—*Apples:* All varieties may be dried, but the soft early kinds become of an unpleasant brown colour.

Peel, core, cut away bruised parts, slice in rings about a quarter of an inch thick. Place the rings thinly on the trays in the drying machine or thread them on string stretched across the laths of the drying frame.

When a drying machine is used the contents of several trays may be put on one tray as soon as the drying has caused them to shrivel, and the empty trays may be refilled.

Pears.—Choose fruit nearly ripe but not soft.

Peel; do not core but dry whole; otherwise proceed as with apples, replacing the fruit in the oven each evening until it is thoroughly dry.

Plums and Damsons.—Stalks and leaves should be removed from the plums, which should then be placed thinly on the tray. The heat may be raised to nearly 200° F., but care should be taken, if the fruit becomes soft and puffy, to prevent it from bursting. This is best done by withdrawing the trays and allowing the fruit to cool. As drying proceeds the temperature must be gradually lowered to about 140° F., otherwise the fruit will char; and for this reason, when it is thoroughly dry, withdraw the fruit from the oven and leave it exposed to the air for a few days until the plums, having taken up moisture from the air, are of the consistency of prunes. Pack them in clean, dry, well-stoppered bottles or in boxes lined with waxed paper.

The dried plums or damsons must be examined from time to time, and if any sign of dampness or mould appear they should be wiped with a dry cloth and put back again to dry in the oven for a short time.

It often happens that the sugar in the plums comes out of the fruit and appears as a whitish or pale grey powder. This is easily distinguished from mould by the fact that the plums with the powdering of sugar are *not* soft, and the sugar is in the form of a dry powder, whereas the mould is woolly in texture.

Except for the appearance the coating of sugar is no drawback to the quality of the fruit. When the plums are stewed the sugar of course is dissolved.

Cherries (without sugar).—Stone the cherries and set them in a pan over the fire with only the liquor that comes out of them. Shake well when they boil, put them in an earthenware jar. Next day scald them, and when cold, place them on sieves to dry in a warm, slow oven.

Potatoes.—By proper storage in a cool, dry, frost-proof shed, or failing that, in a clamp or pie—(see Royal Horticultural Society's Pamphlet on "The Cultivation of the Potato")—potatoes may be kept in good condition for many months, and therefore drying of potatoes is not to be recommended except where a drying machine is available for use.

To dry Potatoes in a drying machine.—Peel, cut in slices three-sixteenths of an inch thick. Cook *lightly* in boiling water or preferably by steaming, and stop the cooking before the potatoes begin to become floury. Spread the slices thinly on the trays and dry at a temperature just below 160° F. As the slices dry, the contents of several trays may be put together on one tray and the empty trays refilled.

Carrots, Parsnips, Turnips, Swedes.—Peel or scrape so as to remove the outer skin. Cut into slices three-sixteenths of an inch thick, or into shreds by means of a hand-grater. Steam for a few minutes, place thinly on the tray, and transfer to the oven The temperature must not exceed 160° F., otherwise the vegetables will become brown.

Onions.—To avoid the unpleasantness of peeling onions immerse them in boiling water a minute. Peel, slice—do not steam. Dry as above.

Leeks.—Follow instructions for onions, but do not put them in boiling water.

Cabbage and other Greens.—After soaking in salt water as if for cooking, cut in half, remove the thick stems and heavy midribs. Slice as for pickled cabbage and place the pieces in the tray so that they lie loosely to the depth of one inch. To preserve a good colour the temperature should be about 140° F.

Spinach.—Follow instructions for cabbage.

Parsley.—Follow instructions for cabbage.

Peas and Broad Beans, Haricot Beans and Scarlet Runners.—The seeds may be dried in the oven; but the simplest course is to harvest them.

Dried Green Peas.—The best peas for drying are marrowfat peas. These should be gathered while still green and yet too old to serve as a vegetable. Place the peas in a pan of cold water to which is added a sprig of mint, half a teaspoonful of salt and a pinch of bi-carbonate of soda. Bring to boiling point and allow them to boil for two minutes. Drain, dry carefully on a towel and place on trays. Dry in a cool oven. Pack in jars for storing.

NOTE.—Peas may be dried without the preliminary cooking. Shell the peas and dry them either in the sun or in the oven. When required for cooking. soak the peas for twenty-four hours, adding a pinch of soda to the water and boil until soft.

French Beans and Scarlet Runners.—Remove the strings, cut in strips, place in cold water to which a pinch of bi-carbonate of soda has been added. Drain place on the tray and dry as advised for cabbage.

Mushrooms.—Reject those with maggots. Wipe clean, remove skin, lay on paper sheets on trays.

Herbs—Thyme, Mint, etc.—Dry at a low temperature (not above 140° F.). There is no need to remove the stalks as the leaves easily separate when dry.

General Observations.

1. Observe scrupulous cleanliness.
2. Both with drying apparatus and oven, beginners should commence by drying small quantities at a time. Having gained experience as to the best temperature and the length of time required, the drying of large quantities may be undertaken.
3. Fruit should be ripe but not over-ripe, and should be in good condition.
4. Vegetables should be dried in their proper seasons and not after storage.
5. Sun heat in this country is rarely powerful enough for drying ; but *empty* greenhouses may well be used for drying purposes.
6. For use in soups and stews, soak the dry vegetables till they have regained their natural size, and add to stock.

Storage.—Dried fruit and vegetables must be kept in a *dry* place. The simplest way is to put the dry fruit and vegetables in stout brown paper bags and to hang the bags in the kitchen. If no thoroughly dry room is available store in tins or in air-tight bottles.

The dried products should be inspected from time to time and if dampness or mildew appears they should be wiped with a dry cloth and redried.

The more the light can be excluded, the less the colour is destroyed.

Production of Food in Urban Centres: Birkenhead.

Birkenhead is a county borough with a registered population of 135,000, but, owing to the large influx of workers in shipyards and munition works during the War, has a real population of about 160,000. The town area is closely built over and because of the density of population (one of the highest in the country) the inhabitants have spread beyond the boundaries, to extend which a Local Government inquiry was held immediately prior to the outbreak of War. The demand for allotments within the area has always been keen, but, owing to strong local prejudice against them on account of their alleged unsightliness, the Council has repeatedly refused to exercise its power under the Allotments and Small Holdings Acts, rejecting, for example, during 1915 and 1916, no less than three motions to allow portions of its own land to be used for the purpose. It should be noted that in one respect the town is badly placed for allotment purposes, as a very large portion of its boundaries is made up of the River Mersey,

The repeated debates in the Council had the effect of familiarising the community with the allotment movement, and on the issue of the Land Cultivation Order, 1917 (which was immediately referred by the Council to the Allotments Committee with full powers to act), everything was ready for its application. The small Allotments Committee at once invited to its assistance representative farmers and horticulturists in the district, and expanded from a Committee of five persons to one of fifteen, later on adding thereto representative delegates from the allotment holders themselves. This Committee immediately:—

(1) secured stocks of implements in order to forestall any attempts to raise prices or any failure to obtain supplies;
(2) obtained firm offers of seed and accepted quotations;
(3) organised manure supplies;
(4) arranged for bringing on under glass (in consequence of the late start) large quantities of plants for spring planting;
(5) prepared schemes which were laid before the inhabitants.

The first movement was for the fullest possible increase in the number of allotments. An allotment appeals to the individualistic instinct of an Englishman; the man upon it is working for himself, puts his best into it, helps himself first and thereby relieves the market for other buyers. To every man or woman who desired one, an allotment was offered even if it should mean the closing of all parks and the breaking up of all recreation grounds. There was a large demand which continued steadily and was fully met, until in three months about 2,500 allotments were under cultivation within the borough. Practically every available area of land fit for immediate use was scheduled, let, and put under crop.

The principles on which the Committee worked were as follows :—

(1) To select and test all land, in order to make sure that it might reasonably be expected to carry fair crops. As a result, with the exception of a few isolated plots which called for additional labour and which are to be met with on almost on all newly-dug land, the prospects for the season are excellent.

(2) To charge an economic rent which would ensure serious cultivation, and enable reasonable assistance to be given in the development of areas by the proper laying out of the land and by the provision of water supplies and skilled advice where needed.

(3) To prevent, when necessary, individual actions which tend to spoil the work of the other allotment holders.

Every effort was made to weld the allotment holders together into a well-organised movement, self-supporting and mutually helpful. Committees were selected at open meetings for each group of allotments, and officials appointed to represent them, these in turn electing representatives upon the Central Committee at the Town Hall.

It was reasonably certain that with a great extension of garden work, implements would be scarce and might advance rapidly in price. One of the first things done, therefore, was to lay in a stock of spades, forks, hoes, etc., which, when the local tradesmen ran short or showed a tendency to raise prices, were put on the market with excellent effect. The same plan was followed with regard to manures. Efforts by traders to exploit the allotment enthusiasm were a complete failure largely owing to the action of the Committee in distributing at a fair rate the manures produced, manufactured or bought in by the Corporation.

In regard to seeds and plants, the Committee secured its seed potatoes through the Board of Agriculture, and in due time received an excellent supply, both in quality and quantity. All other seeds necessary for allotments were secured from one of the large growers. These were tested, put up in suitable quantities and distributed at cost price. By the assistance of the owners of large garden establishments and of the Parks Committee, who cleared their greenhouses of flowering plants, large quantities of all varieties of *Brassica* were brought on and distributed. The difference in prices charged by the Committee and those charged by others indicated that allotment holders had been saved up to £1,000 in plants, seeds, implements, potatoes, and manures.

Side by side with the provision of allotments the Committee took up in other ways the work of food production. They turned to the assistance of the farmers near the town and, having enrolled Corporation workers who had agricultural experience, these were liberated for service on the land. The Committee organised all available labour, as for instance, those who have neither the time nor the inclination to work an allotment alone, yet who have time which might be given to working ground in common with others.

Schemes for school gardens to be used for food production were prepared and submitted to the Board of Education. There was at the time much criticism, but the Board approved and has since requested all school authorities to do similar work. The land was provided by the Committee and cultivation went on during school hours, by way of a lesson. Dr. Fisher, the President of the Board of Education, addressing the Association of Education Committees on 8th June in London, laid emphasis on the fact that experience has proved the educational value of the work now being done in the school gardens of the country. It was heavy work for the children at the start—trenching grass land in heavy loam can never be easy work—but the children desired to help in the national crisis, and to-day they have their reward in watching the growing crops.

Schemes were also prepared for men in essential employment who were slack on certain days during the week. The butchers at the lairages took in hand a disused nursery of 10 acres and were later joined by the employees of one of the brewery companies. The other brewery companies also took up large areas, using, under the direction of the Committee and their skilled men, the companies' horses and implements.

The Volunteers took up the land question and digging took the place of drill. The girls in works and factories did their part as did those engaged in large shops, the heads of the establishments arranging with the Committee for land and organising their own staffs in cultivation. Men also who had been exempted by the tribunals gladly gave spare time to the work.

The idealist came to the front and an organisation was formed, "The Birkenhead Co-operative Cultivators," to work land in common for the general good. They took over a large field, and although a late start was made it was well planted with potatoes, which, at the time this note was written, were in a forward condition, with marrow plants in scores rapidly covering the waste heaps and hedges. In order that the wounded should not suffer from shortage, a large area of land was put under cultivation for free hospital supplies and worked by voluntary service.

Many private gardens were inspected for cultivation and the staff of gardeners who, at their employers' request and with their own good will, are co-operating with the Committee were kept busy through the planting season and are now spraying potatoes against disease, the necessary apparatus and materials having been secured early in the year.

In all communal schemes the Committee, realising that its work is production and not profit, employed no rigid standard. In some cases seeds and manure were provided, in others implements as well, and in all cases the land. From two-thirds to the whole of the resultant crops will become the property of the Committee for disposal as circumstances may direct.

In order to work up enthusiasm to the utmost, arrangements were made for an exhibition to be held during the present month, and the schedule of awards issued stipulated that as the awards were to encourage production, the produce shown must be representative of all the garden and must not consist of a few over-grown specimens put up for prize-winning. The allotments themselves were to be inspected for awards before the show was held. The various Committees of the Corporation, such as Electricity, Gas, etc., joined in to make it a complete "welfare" show.

Early in the year the National Housing and Town Planning Council circulated to local authorities questions as to how far a district could supply itself with its own garden produce. Only experience can fully answer such questions with accuracy. Birkenhead estimates this year to supply about one-fifth of the town's needs. Another year double the number of allotment holders might be cultivating their land, so supplying two-fifths. Then, given the land, there is no reason why the size of the individual allotment should not be doubled—600 sq. yd. of land, once under cultivation, is none too large for a man to attend to in odd hours. That done, four-fifths of the town's needs would be supplied. Improved culture will do the rest. Such an outlook is, perhaps, ideal—what is possible is not always probable.

This much, however, can be said: the food shortage of 1917 has conferred upon our towns the inestimable advantage of experience in land cultivation and demonstrated to owners, authorities, and the general public, the possibilities in that direction. It is for allotment holders themselves to show that they are worthy of a permanent place in our civic development, not only by making their plots productive, but also by so maintaining the appearance of allotments, that these should not be an eyesore to the community and a disgrace to a district.

A Co-operative Cottage Gardens Association.*

A VERY interesting form of co-operation in horticulture between employer and employed is reported by the Agricultural Organisation Society in connection with the Buxton Lime Firms, Limited.

The Company in question has works situated in five different districts of Derbyshire, and the employees at all these works are linked up in the Buxton Lime Firms Cottage Gardens Association Each district has a committee and sub-committees, and all are represented on the Grand Committee and the Executive Committee, of which the Managing Director of the Company is Chairman.

For 1*d*. per month rental an employee obtains 200 square yards of ground. For 2*d*. per month, he may have double the amount, and so on, up to the limit of his capacity as a cultivator. The Company gives potato sets free for the first plot, and other vegetable seeds and plants at half cost; if the man has a second plot half the potato sets for this are supplied for nothing, and other vegetable seeds and plants are again available at half price. Lime is given free and manure sold to the men at nominal figures. The Company pays half the value of prizes given for garden produce at local shows in which the employees are interested as competitors, and has granted £50 worth of prizes for gardens connected with schools to which the children of its workers go.

Moreover, 100 acres have been set aside for the collective benefit of the members of the Association, who are thus enabled to buy vegetables from the ground—a member may take up one or more rows on payment of the actual cost of seeds and cultivation; in the event of a member or members declining to exercise this right the Association can sell the produce elsewhere and distribute the money obtained in whatever way is thought fit. Tools are supplied at cost price, and an expert market-gardener advises and instructs the allotment holders, who number about 1,000.

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* Communicated by the Agricultural Organisation Society.

Many women work on the land, notably on the "common land" of the Association. When they become competent agriculturists they are presented with a uniform. They also keep rabbits, pigs, and goats co-operatively.

The idea seems worth the attention of other large concerns in a position to secure land at a reasonable price. It may be mentioned that among the various great capitalists of the country who have taken special measures to encourage co-operative agriculture and stock-keeping by their employees is Lord Rhondda, in connection with whose collieries an admirably conceived co-operative pig-keeping scheme has been set up.

Stoke Newington Allotments under the Cultivation of Lands Order.

ON the issue by the Board of Agriculture and Fisheries of the Cultivation of Lands Order, 1916, conferring (*inter alia*) on the London County Council powers to enter on land for the purpose of the Order, the Council of the Stoke Newington Metropolitan Borough deputed three of its members to deal with the matter, and the Stoke Newington Vacant Lands Cultivation Society was formed. On the 9th March, 1917, the Board delegated their powers directly to the Stoke Newington Council, and on the following day a piece of land in Green Lanes was entered and allotted to 25 cultivators. Subsequently lands comprised in Stoke Newington Common, Finsbury Park and Clissold Park, and some other lands, were placed at the disposal of the Society, who have allotted a total of 700 plots of 5 rods each, leaving 500 applicants for plots still unsatisfied.

Each cultivator pays 5*s*. for his plot, and 1*s*. for water which the Society laid on at a cost of about £70. In return for this payment each plotholder has received seeds, manures and plants of the value of 7*s*. 6*d*. The Society purchased seven tons of seed potatoes for sale to the plotholders, and arranged for potato-spraying on payment of a small charge. Condemned stores of wire were purchased for the purpose of fencing. The work of the cultivators has been carefully guided, with the result that no part of the land is badly cultivated or wasted, and the state of cultivation compares well with that of lands more favourably situated. By the end of May vegetables were already being gathered for consumption.

In addition to the 700 plotholders the membership of the Society comprises about 180 persons who cultivate plots not provided by the Society, and the general enthusiasm of the members is shown by an attendance of 700 at each of the general meetings of the Society, and by a subscription list of £30, besides the provision of two silver cups, for an exhibition proposed to be held in September.

Notes on Feeding Stuffs for September:
From the Animal Nutrition Institute, Cambridge University.

THERE is nothing of interest to remark as to changes in prices since last month. Notes as to the extent and character of supplies have been added to Table I. They show that at the present time there are fair supplies of millers' offals, palm kernel and linseed cakes, and Chinese beans, but that the supplies of most other feeding stuffs are small or irregular or entirely non-existent.

Horses.—Harvest will now be in full swing and horses will be getting an extra ration to keep them up to their work. The cheapest foods now available in fair quantities and suitable for horses are bran, pollards and palm kernel cake, which may be used to replace oats in the following proportions:—

Ten lb. oats may be replaced by 14 lb. bran, 10 lb. pollards, or 8 lb. palm kernel cake. Of palm kernel cake for horses we have no personal experience, but reports are to hand of its successful use. A ration of 5 lb. of pollards, or 7 lb. of bran. and 4 lb. of palm kernel cake might be tried as a substitute for 10 lb. of oats. Or a mixture of 5 lb. of oats with half the above quantities. Owners should introduce the palm kernel cake gradually.

Milking Cows.—Now is the time when cowkeepers should watch their grass. As soon as signs appear of the grass failing, the cows should be given extra food in order to keep up the milk yield, for cows in full milk seldom recover from a check caused by defective feeding in August and September. Green crops should be used where they are available, and a concentrated ration may also be necessary. Bran or pollards, ground nut cake where it can be bought, palm kernel cake, and linseed cake are the cheapest foods suitable for this purpose

TABLE I.

Feeding Stuff.	Digestible Food Units.	Approximate Prices per ton at the end of July									
		London.		Liverpool.		Hull.		Bristol.		Glasgow.	Leith.
		£ s. d.	Supplies	£ s. d.	Supplies.	£ s. d	Supplies.	£ s. d.	Supplies	£ s. d.	£ s. d.
Soya Bean Cake	122·3	—	—	—	—	—	—	—	—	—	—
Decorticated Cotton Cake	126·3	22 0 0	Very small.	—	—	—	None	—	—	—	—
London-made Cotton Cake	71·9	—	—	—	—	—	—	—	—	—	—
Decorticated Cotton Meal	126·3	—	—	—	—	—	—	—	—	—	—
Decorticated Cotton Cake (American)	126·3	—	—	21 15 0	Limited	—	—	—	—	—	—
Indian Linseed Cake	123·1	21 15 0	—	21 15 0	"	—	None	—	—	21 10 0	21 12 6
Russian Linseed Cake	123 5	—	—	—	—	—	—	—	—	—	—
English Linseed Cake	120·1	22 2 6	Fair	22 0 0	Limited	20 10 0 9 per cent.	Poor.	—	—	22 0 0	21 17 6
Bombay Cotton Cake	65·3	—	None	16 10 0	Limited	—	None	16 2 6	Small	—	16 5 0
Egyptian Cotton Cake	71·9	16 7 6	Small	17 5 0	"	15 10 0	Fair	16 12 6	"	16 10 0	16 7 6
Coconut Cake	102·6	18 7 6	Very fair.	—	—	—	None	—	—	—	—
Palm Kernel Cake	96·1	17 0 0	Fair	15 5 0	Moderate	14 12 6	Fair	—	—	17 10 0	—
Palm Kernel Meal (extracted)	92·5	—	—	—	—	—	—	—	—	—	—
Ground-nut Cake	145·2	—	None	—	—	—	None	—	—	—	—
English Beans	99·5	21 9 6	Small	22 15 0	Fair	22 2 0	Poor	—	—	—	—
Bean Meal	99·5	—	—	—	—	—	—	—	—	25 0 0	—
Chinese Beans	101·2	11 1 6 (Horse beans)	Fair	21 18 8	Good	—	None	—	—	—	—
English Maple Peas	97·2	24 4 6	Very small.	—	—	27 15 6	Fair	—	—	—	—
English Dun Peas	97·2	22 9 0	"	—	—	24 9 0	"	—	—	—	—
Calcutta White Peas	97·5	29 2 0	Small	—	—	26 13 4	"	—	—	—	—
American Maize	93·8	18 18 0 (Free)	Irregular.	—	—	—	None	—	—	—	—
Argentine Maize	94·2	18 18 0 (Free)	"	—	—	18 13 4	Fair	18 0 6	—	—	—

TABLE I.—*continued.*

Feeding Stuff.	Digestible Food Units	Approximate Prices per ton at the end of July.									
		London.		Liverpool.		Hull.		Bristol.		Glasgow.	Leith.
		£ s. d	Supplies	£ s d	Supplies	£ s d	Supplies	£ s. d.	Supplies.	£ s d.	£ s. d.
Maize Meal	86·5	22 0 0	Irregular	—	—	19 10 0	Poor	—	—	—	—
Maize Gluten Feed	121·6	19 10 0	Fair	18 10 0	Good	—	None	19 0 0	Small	—	—
Maize Germ Meal	99·2	18 15 0	„	19 10 0	Moderate	—	„	—	—	—	—
English Feeding Barley	83·0	21 0 0	Small	—	—	—	„	—	—	—	—
English Oats	75 4	19 15 0	Very small.	—	—	19 15 0	Poor	23 6 8	Fair	—	—
Argentine Oats	75·4	22 17 0	Small	—	—	—	None	—	—	—	—
Malt Culms	69·9	13 10 0	Irregular	—	—	13 0 0	Poor	—	—	15 0 0	15 10 0
Brewers' Grains (dried)	84·5	18 10 0	„	—	—	16 0 0	„	—	—	—	17 0 0
Brewers' Grains (wet)	21·1	2 10 0	Fair	—	—	1 10 0	„	—	—	—	—
Distillers' Grains (English)	101·2	19 0 0	„	—	—	—	None	18 10 0	Small	17 10 0	—
Distillers' Grains (French)	101·2	19 0 0	„	—	—	—	„	—	—		—
Distillery Mixed Grains (wet)	20·0	—	—	—	—	—	—	—	—	—	—
Egyptian Rice Meal	78·7	—	None	—	—	—	None	—	—	—	—
Burmese Rice Meal	78·7	—	„	—	—	—	„	—	—	—	—
Rice Bran	78·7	—	—	—	—	—	—	—	—	—	—
Wheat Middlings (coarse)	94·8	15 0 0	Fair	—	—	14 15 0	Fair	—	—	16 0 0	15 5 0
Wheat Sharps	90·5	15 5 0	Small	15 5 0	Moderate	14 15 0	„	14 12 6	Good	14 15 0	14 0 0
Wheat Pollards	96·7	—	—	14 0 0	„	—	—	—	—	—	—
Wheat Bran	77·5	12 17 6	Fair	—	—	13 10 0	Fair	12 7 6	Good	14 0 0	13 15 0
Wheat Bran (broad)	79·9	14 17 6	Small	14 2 6	Moderate	15 0 0	„	13 5 0	„	14 10 0	14 10 0
Feeding Treacle	60·0	23 0 0*	—	22 10 0	„	—	None	—	—	—	—
Linseed	153·5	30 0 0	Small	—	—	36 10 0	—	35 0 0	Small	—	‡32 10 0
Linseed Oil	250·0	58 0 0	Fair	†60 0 0	Moderate	56 0 0	—	5s per gal.	„	—	—
Egyptian Cotton Seed	108·6	19 0 0	Small	—	—	19 0 0	—	—	—	—	—
Bombay Cotton Seed	99·6	—	—	—	—	—	—	—	—	—	—
Cotton Seed Oil	250·0	—	—	†73 0 0	—	—	—	—	—	—	—
Fish Meal	145·0	—	—	—	—	—	—	—	—	17 0 0	17 0 0
Locust Bean Meal	80·0	—	—	—	—	—	—	—	—	—	—

* Only fine quality on spot offer. † In barrels. ‡ Crushed.

at present prices. Needless to say they should be used in the smallest quantity which will suffice for the purpose in view.

Cattle for Beef Production.—Prices have now been fixed for the fat cattle which are to be bought for army purposes as follows: prices per cwt. live weight—September 74s.,

TABLE II.

LONDON. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Chinese beans	2	2¼	Malt culms	3	10½
Brewers' grains (wet) ..	2	4½	Linseed	3	11¼
Wheat middlings ..	3	2	Argentine maize ..	4	0
Maize gluten feed ..	3	2½	American maize	4	0½
Wheat bran	3	3¾	English beans	4	3½
Wheat sharps	3	4½	Brewers' grains (dried) ..	4	4½
Decorticated cotton cake	3	5¾	Egyptian cotton cake ..	4	6¾
Egyptian cotton seed ..	3	6	English dun peas ..	4	7½
Palm nut cake	3	6¼	Linseed oil	4	7¾
Indian linseed cake ..	3	6½	English maple peas ..	4	11¾
Coconut cake	3	7	English feeding barley ..	5	0¾
English linseed cake ..	3	8	Maize meal	5	1¼
Wheat bran (broad) ..	3	8½	English oats	5	2¾
Distillers' grains (English)	3	9	Calcutta white peas ..	5	11¾
Distillers' grains (French)	3	9¼	Argentine oats	6	0¾
Maize germ meal ..	3	9½	Feeding treacle	7	8

TABLE III.

LIVERPOOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Wheat pollards	2	11	Maize germ meal ..	3	11¼
Maize gluten feed ..	3	0½	Chinese beans	4	4
Palm nut cake	3	2	English beans	4	7
Wheat sharps	3	3¾	Egyptian cotton cake ..	4	9
Decorticated cotton cake	3	5¼	Linseed oil	4	
Indian linseed cake ..	3	6½	Bombay cotton cake ..	5	0¾
Wheat bran (broad) ..	3	6½	Cotton seed oil	5	10½
English linseed cake ..	3	8	Feeding treacle	7	6

TABLE IV.

HULL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet) ..	1	5	Argentine maize ..	3	10
Palm nut cake	3	0½	Egyptian cotton cake ..	4	4
Wheat middlings ..	3	1½	English beans	4	5½
Wheat sharps	3	3	•Linseed oil	4	5¾
English linseed cake ..	3	5	Maize meal	4	6
Wheat bran	3	5¾	Linseed	4	9¼
Egyptian cotton seed ..	3	6	English dun peas ..	5	0¼
Malt culms	3	8¾	English oats	5	2¾
Wheat bran (broad) ..	3	9	Calcutta white peas ..	5	5¾
Brewers' grains (dried) ..	3	9½	English maple peas ..	5	8½

TABLE V.

BRISTOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Maize gluten feed ..	3	1½	Argentine maize ..	3	11½
Wheat bran	3	2½	Linseed	4	6½
Wheat sharps	3	2¾	Egyptian cotton cake ..	4	7½
Wheat bran (broad) ..	3	3¾	Bombay cotton cake ..	4	11½
Distillers' grains (English)	3	8	English oats	6	2½

TABLE VI.

AVERAGE PRICES PER FOOD UNIT.
LONDON, LIVERPOOL, HULL AND BRISTOL.

	s.	d.		s.	d.
Brewers' grains (wet) ..	1	10½	Argentine maize ..	3	11
Wheat pollards	2	11	American maize ..	4	0½
Wheat middlings ..	3	1¾	Brewers' grains (dried) ..	4	1
Maize gluten feed ..	3	2½	English beans	4	4
Palm kernel cake ..	3	3	Linseed	4	4¾
Chinese beans	3	3	Egyptian cotton cake ..	4	7
Wheat sharps	3	3½	Linseed oil	4	7½
Wheat bran	3	4	Maize meal	4	9½
Decorticated cotton cake	3	5½	English dun peas ..	4	10
Egyptian cotton seed ..	3	6	Bombay cotton cake ..	5	0
Indian linseed cake ..	3	6½	English feeding barley ..	5	0½
English linseed cake ..	3	7	English maple peas ..	5	4
Coconut cake	3	7	English oats	5	6½
Wheat bran (broad) ..	3	7	Calcutta white peas ..	5	8½
Distillers' grains (English)	3	8½	Cotton seed oil	5	10½
Distillers' grains (French)	3	9½	Argentine oats	6	0½
Malt culms	3	9½	Feeding treacle	7	7
Maize germ meal ..	3	10½			

TABLE VII.

GLASGOW. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	4	Wheat bran (broad) ..	3	7½
Wheat sharps	3	3	Palm nut kernel cake ..	3	7¾
Wheat middlings ..	3	4½	English linseed cake ..	3	8
Distillery mixed grains (dried)	3	5¾	Malt culms	4	3½
Indian linseed cake ..	3	6	Egyptian cotton cake ..	4	7½
Wheat bran	3	7½	Bean meal	5	0½

TABLE VIII.

LEITH. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	4	English linseed cake ..	3	7¾
Wheat sharps	3	1½	Brewers' grains (dried) ..	4	0½
Wheat middlings ..	3	2¾	Crushed linseed	4	5
Indian linseed cake ..	3	6½	Malt culms	4	3½
Wheat bran	3	6½	Egyptian cotton cake ..	4	6½
Wheat bran (broad) ..	3	7½	Bombay cotton cake ..	4	11½

TABLE IX.

AVERAGE PRICES PER FOOD UNIT.

GLASGOW AND LEITH.

	s.	d.		s.	d.
Fish meal	2	4	Palm nut kernel cake ..	3	7¾
Wheat sharps	3	2	English linseed cake ..	3	8
Wheat middlings ..	3	3½	Brewers' grains (dried) ..	4	0¼
Distillery mixed grains (dried)	3	5¾	Crushed linseed	4	3
Indian linseed cake ..	3	6¼	Malt culms	4	4½
Wheat bran	3	6¼	Egyptian cotton cake ..	4	6¾
Wheat bran (broad) ..	3	7½	Bombay cotton cake ..	4	11¾
			Bean meal	5	0¼

October 72*s.*, November and December 67*s.*, January onwards 60*s.* The Food Controller has announced that corresponding prices will shortly be fixed for all other fat cattle, though probably not on a live weight basis, and there is no doubt that he will also fix prices for mutton and pork. He has also said that he would endeavour to reduce the prices of purchased feeding stuffs. This, however, will not be any great help to the beef and mutton producers, for the estimated supply of oil cakes is likely to be so small that it will hardly do more than satisfy the needs of the milking cows on a very moderate scale.

A certain amount of cake is however still available, and it is suggested that farmers should use a small cake ration for their more forward and younger cattle so as to bring them to the butcher before the grass goes. Older cattle will be more likely to make some sort of progress on the short commons which must be their lot in the winter.

Sheep.—Ewes should not be put with the ram until about Michaelmas, so that the lambing season may be deferred until there is a prospect of keeping the ewes and lambs without the use of much concentrated food.

Lambs and tegs in forward condition will go back on roots in the winter unless they get a fair ration of cake, which it may be impossible to provide. Farmers who consider the future will look over their lambs and tegs, and pick out all those which promise to be ready for the butcher before Christmas. These should get a little cake now so that they may come to the butcher before the shortage of cake gets worse. Lambs and tegs which do not promise to be ready for slaughter by Christmas should be run as stores during the winter and fatted next summer, since they are not likely to fatten in the winter without more cake than will probably be available.

Shearings and cull ewes should be kept as stores until they go on to roots for the winter. They will put on flesh in the winter on roots if helped with whatever dry fodder may be available.

Pigs.—There is at present a fair supply of wheat offals, and there will no doubt be a certain amount of chats from the second early potatoes. It will hardly be possible to cook these, on account of the coal shortage but if sliced or pulped and mixed with an equal weight of a mixture of 5 parts of sharps or middlings and 1 part of palm kernel meal or cake, they should form a useful change for pigs which have been on grass or green stuff.

TABLE X.

(1) Name of Feeding Stuff.	(2) Nutritive Ratio.	(3) Per cent. digestible. Protein.	(4) Fat.	(5) Carbo-hydrates and Fibre.	(6) Starch equiv. per 100 lb	(7) Linseed Cake equiv. per 100 lb.
Foods Rich in both Protein and Oil or Fat.						
Ground nut cake	1 : 0·8	45·2	6·3	21·1	77·5	102
Soya bean cake	1 : 1·1	34·0	6·5	21·0	66·7	88
Decort cotton cake	1 : 1·2	34·0	8·5	20·0	71·0	93
Linseed cake, Indian	1 : 1·9	27·8	9·3	30·1	77·1	101
Linseed cake, English	1 : 2·0	26·7	9·3	30·1	76·0	100
Cotton cake, Egyptian	1 : 2·1	15·5	5·3	20·0	40·0	53
Cotton cake, Bombay	1 : 2·5	13·1	4·4	21·5	37·6	49
Distillers' grains (English) Distillers' grains (French)	1 : 2·9	18·7	10·2	29·0	57·3	75
Maize gluten feed	1 : 3·0	20·4	8·8	48·4	87·4	115
Brewers' grains, dried	1 : 3·5	14·1	6·6	32·7	50·3	66
Coconut cake	1 : 3·8	16·3	8·2	41·4	76·5	101
Palm kernel cake	1 : 4·5	14·1	6·1	48·9	76·7	101
Linseed	1 : 5·9	18·1	34·7	20·1	119·2	157
Bombay cotton seed	1 : 6·6	11·0	16·8	30·1	77·5	102
Fairly Rich in Protein, Rich in Oil.						
Maize germ meal	1 : 8·5	9·0	6·2	61·2	81·0	107
Rice meal	1 : 9·4	6·8	10·2	38·2	68·4	90
Rich in Protein, Poor in Oil.						
Fish meal	1 : 0·1	54·0	4·0	—	60·0	78
Peas, Calcutta white	1 : 2·1	23·3	1·1	45·9	66·9	88
Beans, English	1 : 2·6	19·3	1·2	48·2	67·0	88
Beans, Chinese	1 : 2·6	19·6	1·7	47·9	67·0	88
Peas, English maple	1 : 3·1	17·0	1·0	50·0	70·0	92
Palm-nut meal (extracted)	1 : 3·4	15·6	1·9	48·7	66·1	87
Brewers' grains, wet	1 : 3·5	3·5	1·5	8·6	12·7	17
Malt culms	1 : 3·6	11·4	1·1	38·6	38·7	51
Cereals, Rich in Starch, not Rich in Protein or Oil.						
Barley, feeding	1 : 8·0	8·0	2·1	57·8	67·9	89
Oats, English	1 : 8·0	7·8	4·0	47·4	59·7	79
Oats, Argentine	1 : 8·0	7·2	4·0	47·4	59·7	79
Maize, American	1 : 11·5	6·7	4·5	65·8	81·0	107
Maize, Argentine	1 : 11·3	6·8	4·5	65·8	83·5	110
Maize meal	1 : 13·0	5·5	3·5	63·3	77·8	102
Wheat middlings, fine	1 : 4·8	13·2	3·0	53·8	72·0	95
Wheat middlings, coarse or sharps	1 : 5·2	13·8	4·3	50·5	64·0	84
Wheat pollards	1 : 4·3	11·6	4·0	51·6	60·0	79
Wheat bran	1 : 4·7	11·3	3·0	45·0	48·7	65
Wheat bran, broad	1 : 4·7	11·3	3·0	45·4	48·1	63
Locust bean meal	1 : 22·1	4·0	0·7	69·2	71·4	94

OFFICIAL NOTICES AND CIRCULARS.

THE following Notice, dated 3rd August, 1917, was issued by the Food Production Department:—

The Nation's Food: The Revised Agricultural Programme for 1918.

The Press in general, and the agricultural Press in particular, is discussing freely the agricultural programme of the Government for 1918. Not all the writers of letters or articles on the subject seem to be aware of the exact terms of the demand now made by the Board of Agriculture on the farmers in the interest of the national food supply. Sir Arthur Lee, Director-General of Food Production, has therefore issued a statement giving not only the total figures of the revised agricultural programme for the country as a whole for next year, but the details for each of the counties in England and Wales.

The public is familiar with the statement, made more loosely perhaps in popular debate than in the original authoritative form, that the Government urged farmers to plough up an additional "3,000,000 acres of grass land." The public probably is not so generally aware that since the first declaration of this Policy of the Plough in the spring, the demand upon our agriculturists has been modified in material particulars. It is well for the purposes of profitable debate that the public should understand the programme to date, and why it has been revised.

In 1916 there were 5,730,000 acres under corn crops (wheat and barley oats, rye, beans and peas) in England and Wales. The Board aim at an addition to this area of 2,600,000 acres in the harvest of 1918—an addition of 300,000 acres has already been made. In 1918 the Board expect to secure 600,000 acres of potatoes as compared with 428,000 acres grown in 1916. Nearly one-half of this increase has already been obtained. To the area under mangolds and other fodders essential in the winter-feeding of cows it is proposed to add about 230,000 acres. The total additions to the crops which may be used either directly as human food or for the production of milk will thus be 3,000,000 acres as compared with 1916. On the other hand, reductions in the areas of temporary grass and in certain of the less important crops of arable land are proposed, so that the extra 3,000,000 acres of essential crops may, it is estimated, be secured by the ploughing up of about 2,000,000 acres of permanent grass. Over and above mountain and hill grazings, there was 16,000,000 acres under permanent grass in England and Wales in 1916; it is thus only necessary to plough one-eighth of our grass land when preparing for the harvest of 1918; and it may be estimated that quite one-fifth of this task has already been completed.

Various circumstances have combined to bring about this revision of the official programme for 1918. In the first place, the new policy has proved so acceptable in Ireland and Scotland that those two countries have contributed an increased corn production this year over the year 1916 and have arranged to add largely to their tillage for 1918. This factor has enabled the Government considerably to reduce its call upon England and Wales. Other factors in the situation have been the difficulty, without unduly interfering with the supply of man-power for the Army, the Navy, and munition and other essential services, of providing sufficient labour and machinery to carry out the whole of the Government's agricultural programme in one season.

The aim of the Government's revised plan (as it was the aim of the original) is to break up a sufficient amount of the poorer quality grass land that has fallen down since 1870 or thereabout to grow enough cereals to "render the country self supporting in case of extremity." It has never been suggested that grass land only should be used to obtain the additional corn crops; some of these it was assumed would be grown on existing arable land. Many of the critics of the scheme seem to have lost sight of this latter fact, or to have concluded (which was not the case) that the Government was less eager to utilise the arable land more advantageously, by changing the rotation or by improved cultivation, or both, than to break up more grass. At the same time, the Board of Agriculture took the view that we could not reckon, under war conditions with a shortage of labour and fertilisers, upon any great increase next year over the average corn yields per acre of the ten years preceding the War.

The selection of grass land for plough, it should be noted, is in the hands of local men with special qualifications for deciding wisely and fairly; and it is hoped that public opinion will support the County Executives in a spirit of enlightened patriotism. Where the Executive finds it impracticable to break up as much permanent grass land as the Food Production Department suggests, it is open to them to substitute an additional area of temporary grass, although this is a course which obviously must be pursued with caution.

Unless the position of affairs should become unexpectedly more serious during the late summer, the official opinion is that with the good will of agriculturists generally, and a continuance of the energetic and public spirited action of the Executives, it should be possible to approximate very nearly to the ideal of an additional 2,600,000 acres of corn following upon the breaking up of about 2,000,000 acres of permanent grass.

STATEMENT SHOWING THE REVISED AGRICULTURAL PROGRAMME FOR 1918 FOR EACH COUNTY IN ENGLAND AND WALES.

	(*a*)	(*b*)	(*c*)	(*d*)
County	*Corn Area Suggested for 1918*	*Increase in Corn Area over 1916*	*Estimated Area of Permanent Grass to be Ploughed.*	*Percentage of Corn to Total Arable Area of 1918.*
ENGLAND.	*Thousands of Acres.*			
Bedford	105	22	20	63
Berks	135	38	33	66
Bucks	119	40	40	70
Cambridge	152	30	26	64
Isle of Ely	109	10	20	60
Cheshire	136	50	35	60
Cornwall	204	80	25	60
Cumberland	128	55	30	59
Derby	72	30	25	67
Devon	333	130	65	61
Dorset	121	50	40	61
Durham	107	40	25	64
Essex	381	80	62	67
Gloucester	176	70	50	65
Hampshire	246	80	50	60
Isle of Wight	20	6	3	65
Hereford	111	45	40	68
Hertford	153	33	25	68
Hunts	95	20	20	66
Kent	216	78	65	60
Lancs	171	58	40	61

County.	(*a*) *Corn Area Suggested for 1918:*	(*b*) *Increase in Corn Area over 1916*	(*c*) *Estimated Area of Permanent Grass to be Ploughed.*	(*d*) *Percentage of Corn to Total Arable Area of 1918.*
	Thousands of Acres.			
ENGLAND—*continued.*				
Leicester	97	45	50	66
Lincs				
(Holland)	111	20	30	53
(Kesteven)	192	43	30	65
(Lindsey)	381	80	65	62
Middlesex	9	2	2	35
Monmouth	40	25	25	69
Norfolk	506	95	40	62
Northants	147	50	57	69
Peterborough	21	4	4	68
Northumberland	146	70	55	63
Nottingham	165	50	35	65
Oxford	166	50	50	67
Rutland	27	8	7	69
Salop	178	65	50	65
Somerset	160	80	75	68
Stafford	132	60	55	64
Suffolk, E.	227	27	15	67
Suffolk, W.	159	18	10	64
Surrey	72	28	18	63
Sussex, E.	86	35	30	67
Sussex W.	96	30	25	64
Warwick	127	50	50	67
Westmorland	30	15	10	62
Wiltshire	196	70	48	65
Worcester	93	30	25	63
Yorks, E.R.	315	70	40	65
Yorks, N.R.	252	75	60	66
Yorks, W.R.	266	80	70	64
Total (England)	7,687	2,320	1,770	—
WALES.				
Anglesey	41	18	18	53
Brecon	37	19	19	65
Cardigan	77	23	23	63
Carmarthen	93	41	41	70
Carnarvon	35	16	16	56
Denbigh	71	31	31	62
Flint	34	17	17	63
Glamorgan	48	27	27	63
Merioneth	26	11	11	63
Montgomery	69	33	33	66
Pembroke	80	30	30	65
Radnor	31	14	14	60
Total (Wales)	642	280	280	—
Total (England and Wales)	8,329	2,600	2,050	—

(*Note.*—" Corn " includes wheat, barley, oats, rye, beans and peas.)

THE following extract is taken from a Letter, dated 1st August, 1917, which the President of the Board has written to a correspondent:—

Beef Production under War Conditions.

I am glad to have an opportunity of explaining a few of the misunderstandings that have arisen regarding the purchase of cattle for the Army.

The Board of Agriculture are well aware of the opinion of the farmers that the live stock of the country constitute one of our greatest national assets and that, in the interests of the future of agriculture, its numbers should be maintained. In consequence, the farmers feel that no large demand for meat should be drawn for the Army from home sources, because such an addition to the normal demands must inevitably result in a reduction in our flocks and herds. I need not say that from the point of view of agriculture I am in complete sympathy with these opinions, but when I consider the national necessity and the situation forced upon us by the War I am bound to tell you that we must act on other lines.

For three years, in spite of the enormous drain on our resources, in spite of a world shortage of supplies, and in spite of the German submarine, we have maintained our flocks and herds at an even higher level than in the days of peace. We alone amongst the belligerents have been able to do this. Both our Allies and our enemies have long had to make enormous encroachments upon their home supplies. Now, however, the time has come when for a few months at least we, too, are compelled to embark upon the same path, and for the first time to feed a portion of our Army on home-grown meat. This action is not taken by choice, but is forced upon us by the exigencies of War.

We are further fully aware that the farmer disagrees with the policy of the present Order with regard to the provision of meat for the Army, because it seems to call for the slaughter of immature stock. Here, again, I should be entirely with him in the view that it is wasteful to kill immature stock, though perhaps I do not accept the term immature for the cattle that are called for. What we want for the Army are cattle that are comparable to those slaughtered in the Argentine and other countries which supply our imports of meat, *i.e.* cattle that have not reached the degree of finish which in the past has reflected such credit on British graziers and has supplied our public with the finest meat in the world. And this for two reasons.

In the first place, prime beef is no longer economical for the country at large. The last stages of fattening are the most expensive in food, in the sense that more food, and especially more concentrated food, in the form of cake, is consumed in making 1 lb. of human food in the later than in the earlier stages of fattening. I am aware that to the individual this last stage has been the most profitable, because that alone has put the finish on the animal and given it the quality that secured a good price per stone for the whole animal. But the situation has changed even for the individual. As soon as a maximum price is fixed for beef (and broad national considerations compel this imposition of a fixed price), then the farmer cannot realise his extra return for prime quality and he must begin to lose money as soon as the animal ceases to make those increases in weight for the food consumed which are attained in the early stages of fattening. The nation can no longer afford prime beef, and it certainly will not pay the farmer to make prime beef at second quality prices.

Secondly, I must warn you again of the increased and increasing shortage of feeding stuffs. However little we like it, we must accept the fact that the needs of the War and the work of the enemy submarine have so reduced the tonnage available that none can be spared for cattle food. We are cut off from maize, from feeding barley, from oats, from foreign peas and beans, from foreign-made cake; even the oilseeds from which cakes are made at home are so reduced in amount that during the coming winter the supply of cake will be little more than is wanted for the milch cows. Of course I know that some parts of the country are more able than others to fatten cattle upon the produce of the farm—upon turnips and straw. All the same, feeding stuffs of any kind will be so short that cattle cannot be fattened to their former pitch, and the country must be supplied with as much meat as can be turned out half-fat rather than with a smaller quantity of the prime article.

It is not a question of agricultural policy, nor of the wishes of the farmer to carry on his business in the way he knows is best for it; it is the stern stress of the War to which every single interest, whether of an industry or an individual, must be subordinated. What agriculturists are called upon to do is to find meat for the people, even if the farmer becomes thereby less able to resume his normal business when war ceases. Farmers must trust the Departments of Agriculture to watch that the reduction in stock is not carried down to the danger point and to protect our most valuable element in the future reconstruction, namely, our pedigree herds and flocks.

One word about prices. I know you are not satisfied with what has been fixed. I am far from satisfied with them myself, but Agricultural Departments cannot push the claims of the farmer too far against the community, and we had to accept a compromise. I do not, and I am sure you would not, wish to see a position grow up in which the farmer could be represented as blackmailing the community in its need. No greater misfortune has happened in the relations of agriculture to the country at large than the wild rise in meat prices and the consequent speculation in store cattle and grass that has marked the last six months. We are bound to get back to the position of 1916 when the prices of second-class cattle did not reach 60*s*. until December, and though in the process many farmers, who bought this year in good faith, must lose money over their beasts, yet the price of 60*s*., low as it now seems, will admit of a profit to the grazier provided that the price of stores, which normally accounts for two-thirds of the cost of the finished beast, is brought down to a corresponding level. I should also point out that the price of 60*s*. live weight refers to Army cattle only and that the good farmer, who normally turns out his beasts with a higher proportion of dead to live weight than is sought by the Army, will obtain a better live-weight price than those published, because civil prices will be fixed upon a dead weight basis.

I am aware, only too painfully aware, how unwelcome the prices that have been fixed are to the agricultural community, how resentful many men feel at the losses with which they are faced—resentful to the point that they feel they will make no further effort to further the production of food. I beg of them to think twice before coming to any such determination; the level to which prices have been rising this year is not only a danger to the State but a danger to the continued prosperity of agriculture in that a bitter and indiscriminating current of public opinion was being set up against all farmers. The State has definitely promised that, in future, farming and farmers will be of national concern; we might have seen all this ground we have gained swept away in one gust of popular anger. Anxious and difficult as the times have been, few farmers can honestly say that the War has not brought money into their pockets; let us write off any loss the Order may cause as a gift to the nation; we are all called upon to make sacrifices, and in the last resort every man must ask himself "Is my sacrifice adequate; is it as great as that of others?"

R. E. PROTHERO.

Compensation for the Ploughing up of Grass Land.*

THE following Circular Letter, dated 4th August, 1917, has been addressed by the Food Production Department to County Agricultural Executive Committees in England and Wales:—

SIR,—It had been hoped that special arrangements might be made to provide for any loss incurred by the conversion of grass land to arable cultivation in connection with the Food Production Scheme. Unfortunately, the proposals which had been framed for that purpose have been found impracticable. It is, however, open to landlords and tenants where a compulsory Order has been made for the breaking up of grass land, to apply to the Defence of the Realm (Losses) Royal Commission for compensation for any direct and substantial loss incurred or damage sustained by reason of interference with their property or business under the Defence of the Realm Regulations.

In order to safeguard the claims of both landlords and tenants where such loss is incurred the Agricultural Executive Committees should, in every case in which grass land is broken up, make an Order for the purpose under Paragraph 1 (*e*) of Regulation 2M. Such an Order should be made in cases where both parties consent to the breaking up as well as in cases where the landlord or tenant objects to the breaking up. The making of such an Order in every case will prevent those who break up land voluntarily from being put in a worse pecuniary position than those who object to doing so, except under compulsion. It is regretted that it should be necessary to recommend the making of Orders which have the appearance of compulsion upon those who agree to the breaking up of land at some sacrifice of their own interests and views in order to assist in increasing the food supply of the country, but it should be explained that the Order is rendered necessary only so that their claims may be safeguarded.

I am, etc.,

ARTHUR LEE, *Director-General.*

Exemption from Military Service for Men Employed on Farm Work.

THE following Memorandum, dated 18th July, 1917, has been sent by the Food Production Department of the Board to the Agricultural Executive Committees in England and Wales, and to the Board's representatives before the Appeal and Local Tribunals:—

1. It has been agreed that no men who were on the 1st of June, 1917, and are still employed whole-time on a farm on farm work of national importance shall be posted for service with the Colours, or

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* See also *Journal*, June, 1917, p. 353.

called up for medical examination or re-examination, except with the consent of the County Agricultural Executive Committee, even though a substitute may have been provided or offered This arrangement is referred to in this Memorandum as the "Agreement" The description "employed whole-time on a farm on farm work" covers men employed in agriculture as thatchers, drivers of engines or motor tractors (including tractor ploughmen), and market gardeners whole-time employed in producing food of a character and amount to constitute national importance The description does not include work on a poultry farm or a market garden for the production of flowers or of fruit.

2 **Procedure as regards a Man whose Case has been Finally Disposed of by the Tribunals.**—If the recruiting officer knows that the man falls within the agreement, and that the County Agricultural Executive Committee would not consent to his being called up, no action will be taken by the recruiting officer, and the man will be allowed to remain in his civil occupation

3 If the recruiting officer is in doubt he will send the man a calling up notice attached to which will be Army Form W 3618 on which the man can claim that he comes within the agreement, and which he will complete and return, at the earliest possible moment to the recruiting officer If the recruiting officer, from his own knowledge is satisfied of the accuracy of the claim on the particulars furnished, he will cancel the calling up notice If he is not satisfied he will refer the case to the County Agricultural Executive Committee, sending Army Form W 3618 for the claim to be verified The Committee will make inquiries and will, if clearly satisfied that the man is engaged whole time on a farm on farm work and that his work is of national importance, and that he was already engaged on such work on the 1st of June, 1917, complete and send to the recruiting officer the Voucher A on Army Form W 3618 to that effect On receipt of this voucher confirming the claim the recruiting officer will cancel the calling up notice If, however, the Committee are not satisfied that the claim is warranted or if they consent to the man being called-up (see paragraph 13 of this Memorandum) they will complete and send to the recruiting officer the Voucher B on Army Form W 3618 In either case they will strike out the Voucher A or B which is inappropriate

4 **Procedure as Regards Calling Up of Men for Medical Examination or Re-examination.**—Procedure similar to that outlined in the foregoing paragraph will be followed in the case of a man who, being engaged whole-time on a farm on farm work of national importance, is called up for medical examination or re examination

5 **Cases in which the Calling-up Notice may be Enforced.**—It is essential that the Executive Committee should deal with cases with the least possible delay If the recruiting officer has not received a voucher confirming the man's claim within three weeks from the date on which the Army Form W 3618 is sent to the Committee by the recruiting officer, or if the Committee do not confirm the man's claim, his calling-up notice will be enforced

6. **Procedure as regards Men whose Cases have not been Finally Disposed of by the Tribunals.**—(*a*) *Men who hold Absolute or Conditional Certificates of Exemption* —Before application is made to a Tribunal by

the military representative for the withdrawal of an absolute or conditional certificate of exemption held by a man whose case may be one covered by the agreement, the case will be referred by the Local Military Authorities to the County Agricultural Executive Committee, and if he is a man to whose calling up the Committee would not be prepared to consent, and to whom they would be prepared to issue a voucher that he comes within the agreement, no application for the withdrawal of the certificate will be lodged with the Tribunal (see, however, paragraph 10 of this memorandum)

7 (*b*) *Men who hold Temporary Certificates of Exemption, or who have not yet made Application to the Tribunals*—Although men covered by the agreement will not be liable to be posted for service with the Colours, even if they do not apply for certificates of exemption, or for renewal of existing certificates, yet it is very desirable in their own interests that such men should make full use of their statutory and other rights by applying to the Tribunals for formal certificates of exemption or for renewals thereof In this connection, it is necessary to emphasise the fact that there is no provision enabling a Tribunal to hear an application made out of date for the renewal of a certificate of exemption The periods within which application may be made by a man attaining the age of 18 and within which application for a renewal of a certificate of exemption may be made are set out in the Notice A 198 (*b*)/L issued by this Department, dated the 20th March 1917 *

8 In order that the Agricultural Executive Committees and the Tribunals may work together, and in order to avoid any unnecessary waste of time of the farmer and his employees, a form of procedure has been suggested by the Local Government Board to the Tribunals with regard to applications or appeals for agricultural workers now before or which may later come before the Tribunals

This procedure is set out in a Memorandum R144† which has been issued by the Local Government Board to Tribunals a copy of which is enclosed so that the Agricultural Executive Committee may be aware of the method which will be adopted by Tribunals in dealing with applications or appeals

9 In view of the arrangements outlined in the enclosed Local Government Board Memorandum R144, it is suggested that the Agricultural Executive Committee should consider afresh the desirability of nominating suitable gentlemen to act as agricultural representatives before any of the Local Tribunals in their county which at present have no such representative

10 **General.**—If the recruiting officer objects in any individual case to the decision of the Agricultural Executive Committee he will send particulars to the War Office, who will refer the matter to the Food Production Department

11. If a man engaged whole time on a particular farm on farm work, changes his place of employment the previous voucher issued by the Agricultural Executive Committee will cease to be of effect, but they may issue a voucher for his new employment if this warranted

12 As a general rule it will not be necessary for the Agricultural Executive Committee to inquire into the case of an individual man with a view to the issue of a voucher except

(*a*) Where the recruiting officer refers the case to the Committee (see paragraphs 3 and 6 of this Memorandum),

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* See *Journal* April 1917, p 10,

† Not here printed

(*b*) Where the case is referred to the Committee as a result of an application to a Tribunal for a certificate of exemption or the renewal of a certificate of exemption (see Local Government Board Memorandum R 144 enclosed).

13. The effect of the agreement is that no man whole-time employed on a farm on farm work can be removed from his civil occupation without the consent of the Agricultural Executive Committee. It will, however, be the duty of the Committee to notify the military authorities that a particular man is not entitled to the benefit of the agreement in the following circumstances:—

(1) If the Committee are satisfied that the man's work is not of national importance;

(2) Where the man is employed on a farm on which there is an excess of labour, unless

(*a*) Within three weeks from the date on which the case was referred to the Committee they have specified a farm to which the man is to move within three weeks of the date of the Committee's notification to the man, and

(*b*) The Committee are satisfied that the man will move as directed.

If the man does not move within the time specified, the Committee will notify the recruiting officer that he is not entitled to the benefit of the agreement.

14. This Department understand that cases have occurred in the past where Agricultural Executive Committees have purported to issue instructions to recruiting officers and have even given directions where a man has already been posted for military service that he is not to report. It must be clearly understood by Committees that they have no authority to give such instructions or directions. In any case in which the Committee are of opinion that the recruiting officer is acting improperly, the matter should at once be referred with full particulars to this Department. The matter will then be taken up at once with the War Office, who have undertaken to have immediate inquiry made in order that every matter may be adjusted forthwith.

15. Copies of a form of Voucher F.P. 84 to be used by County Agricultural Executive Committees in cases other than those in which Army Form W 3618 is referred to them by the recruiting officer have been printed and will be supplied on application to this Department.

ARTHUR LEE,
Director-General.

THE following Memorandum, dated 25th July, 1917, has been issued by the Food Production Department of the Board to Agricultural Executive Committees:—

Employment of Civilian Prisoners of War.*

Agricultural Executive Committees are notified that the Home Office have agreed that when persons employing Civilian Prisoners of War under the conditions laid down in the Leaflet A/206/L† are prepared to pay them a wage of 25*s*. a week or over, the amount to be deducted in respect of the cost of board and lodging may be increased from 12*s*. 3*d*. to 15*s*. a week.

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* See *Journal*, May, 1917, p. 242, and Feb., 1917, p. 1134.

† Not here printed.

Labour for the 1918 Programme.

THE following Circular, dated 19th July, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees in England and Wales:—

SIR,—1. I am directed to acquaint you that arrangements have now been made by which a large number of soldiers will be made available in the course of the next few weeks for work on the land in connection with the Programme for increased cultivation for the 1918 harvest. These men will be made available gradually and will be sent to Agricultural Distribution Centres (with which the present Agricultural Depots will be incorporated) conveniently situated for each county.

2. The arrangements contemplated by the Department include the supply of:—

(*a*) Horses with soldier ploughmen to be let out for fixed periods (according to scale) to farmers who are materially increasing their corn area for 1918, but are unable to carry out the work without this assistance;

(*b*) Horses with soldier ploughmen working in gangs equipped with necessary implements who will deal with small areas (less than eight acres) of corn land which farmers cannot undertake without such assistance;

(*c*) A limited number of experienced men to farmers who have or will undertake to increase materially their acreage of corn land, but who cannot do so without the help of experienced men, but have both horses and implements available for the purpose;

(*d*) A limited number of experienced men to farmers who without such assistance would have farm horses standing idle entailing a less area of their arable land being cultivated for the 1918 harvest; and

(*e*) Unskilled labour to farmers requiring such men for work in connection with the 1918 harvest.

3. *In distributing this labour, Committees must bear in mind that the supply is limited*, and cannot be augmented, so that every care must be taken to see that it is placed where it is most likely to lead to an increased acreage of land being cropped for the 1918 harvest. Special care should be taken to prevent soldier labour being allocated or used in such a way as to displace any women already employed on the land. Indeed, a proved willingness to employ available women workers should be held to constitute a preferential claim for additional soldier labour if the latter is needed. If distributed without proper care and judgment, farmers who are anxious to assist their country by adding to their arable land may be left unaided at the expense of those who merely require the additional labour to overcome present inconvenience in working their holding. Therefore, before approving any application, Committees must obtain information as to the additional acreage to be cropped. Copies of a new application form (which will supersede F. P. 71 and F. P. 11) will be sent to you as soon as possible, but until these are received the form F. P. 71 should be used.

4. Some difficulty may be experienced by this Department in immediately equipping men for work under sub-paragraphs (*a*) and (*b*) above, and, as it is most important that none of the men should be kept idle, your Committee should take immediate steps with a view to at once placing men under the conditions outlined in sub-paragraphs (*c*),

(*d*) and (*e*), always bearing in mind the importance of securing that a due proportion of the county task must be undertaken by any farmer availing himself of this source of labour. In all probability many farmers who are entitled to the services of these men will be unable to commence operations before harvest, but if they are in need of additional men for harvest there is no objection to their having the men forthwith at the rates of wages laid down for harvest work. These soldiers are allotted, subject to military exigencies, for permanent employment in connection with the 1918 programme but as regards the men out on harvest work re-allocation among the various counties may be necessary after harvest.

5. An Army Council Instruction is now in draft placing all soldiers now on the land under the same terms and conditions, which will be substantially those in F. P. 71. A copy of this Instruction will be sent to you as soon as it is issued.

6. The scheme referred to in paragraphs 2 (*a*) and (*b*) under which ploughmen, horses, harness and implements are to be supplied for work under the control of your Committee is being sent to you in the course of a day or two.*

7. It is expected that a first instalment of men with a knowledge of agriculture, or used to handling horses, will be made available for your County early next week at the Distribution Centre at
About unskilled men will also become available at the same time. The Department is instructing its Commissioners to confer with the Authorities and examine on arrival the skilled men to ascertain whether they appear to possess the necessary agricultural experience.

8. Immediate steps should be taken by means of the issue of posters and advertisements to inform farmers of the expected arrival of these men and your Committee should take every possible measure to see that they are immediately taken up on arrival. The despatch of further instalments of men will depend on the rapidity with which men already sent are taken up.

I am, etc.,
ARTHUR LEE,
Director-General.

THE following Memorandum, dated 23rd July, 1917, has been sent by the Food Production Department of the Board to Agricultural Executive Committees :—

Labour for the 1918 Programme.

A copy of the scheme referred to in paragraph 6 of the Circular Letter (C. L. 6)† of the 19th instant is enclosed herewith. Printed copies will be sent to you almost immediately, together with a supply of the necessary forms and cards.

Your Committee should inform the Department as soon as possible of the number of men and horses that can be employed under the scheme immediately and the implements, if any, required to be furnished with such teams. Committees must, however, bear in mind that only a small supply of horses and implements will be available during the next two weeks Further demands for men, horses, and implements can follow at later dates when contracts have been signed or work arranged for gangs of teams.

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* See below. † See above.

None of the soldiers arriving at your distribution centre early next week should be kept back for this scheme as it is imperative that all these men should be got out on to the land as quickly as possible. Further drafts of skilled soldiers will be sent to the centre from time to time for the purposes of the scheme.

Ploughmen and Teams for Bringing Additional Land under Cultivation.

THE following Scheme for supplying teams of horses in charge of ploughmen to farmers requiring assistance to bring additional land under cultivation has been drawn up by the Food Production Department of the Board. It is dated July, 1917:—

1. The Department suggest that for this scheme County Executive Committees should use the Rural District or other area for which District Committees have been formed as the unit of working, and that they should entrust the immediate distribution and supervision of the teams they may allot to each district to the District Committee. The District Committee should nominate some of their members to exercise such direct supervision as may be necessary in connection with any gangs of teams working in their locality.

2. The scheme contemplates that the ploughmen and horses should be utilised in two ways:—

(*a*) by loaning them for a period of one month or over to farmers who have undertaken to add 8 acres or more to their corn area, and have implements available for the purpose;

(*b*) by working in travelling gangs to assist farmers who have areas of less than 8 acres to be cultivated. These gangs will ultimately be equipped with ploughs, cultivators, harrows, rolls, drills, etc., as well as a cart or lorry, all of which will be placed under the Committee's control.

In preparing the scheme for the County as a whole, the Department have allowed for approximately one-half of the teams being equipped and worked in gangs.

Committees may also use horses and men under this scheme for working any land they have entered upon, the usual charges being made against the funds provided for the scheme under which the land has been taken.

(A) *FARMERS WHO HAVE UNDERTAKEN TO ADD EIGHT ACRES OR MORE TO THEIR CORN AREA.*

3. Teams should be loaned only to farmers who have agreed to increase their acreage of corn crops by 8 acres or more, and who the Committee are satisfied would be unable to undertake the whole of the task allotted to them without extra assistance. The basis of allotment is that a team cannot be loaned for a longer period than one month for each additional 8 acres which the farmer intends to crop, but would be unable to do so without this extra help. Where a farmer has already broken up the area forming his task without extra assistance, but in doing so has got into arrears with his ordinary work, he may be allowed the loan of a team for the period to which the scale entitles him.

The Committee may consider joint applications from neighbouring farmers who are entitled to assistance under the above conditions provided the team or teams are accommodated on the same farm throughout the period of hire.

4. Teams will be loaned to farmers by the Committee on the following terms, and the farmer must sign a contract (F.P. 93)* agreeing to the terms before a team is sent to him. Preference should be given to farmers able to provide good accommodation for men and horses :—

(*a*) Payment for the team must be made at the rate of 12*s.* per week for each horse, except in the months of December and January, when the charge may be reduced to such a price as the Executive Committee think fit, but not below 7*s.* 6*d.* per week per horse. The farmer must report to the Committee the arrival of the team and forward at the same time one-third of the amount due, and the balance at the conclusion of the period of hiring.

(*b*) The farmer must provide good stabling and food for the horses, and must work them fairly for reasonable hours only, and keep them in thoroughly good condition and properly shod. He must also provide the necessary materials for keeping the harness in good order.

(*c*) A soldier or other ploughman furnished by the Agricultural Executive Committee must be allotted to take charge of each team of horses, and the horses provided by this Department must not be sent out except in the charge of such a ploughman. When a team is loaned to a farmer, he must find board and lodging for the ploughman and pay him the local rate of wage for a skilled ploughman, deducting 16*s.* a week for his board and lodging.

(*d*) Unless the farmer can satisfy the Committee he has already ploughed up the additional acreage he has promised to crop for the 1918 harvest before hiring the team, he must undertake to fill up and send to the Committee at the end of each week on a card to be provided for the purpose a report showing the progress he has made during the week If the weekly reports indicate that he is failing to make reasonable progress with the work the team must be withdrawn.

5. When the whole operations of ploughing, cultivating, drilling, etc., cannot be completed during the period for which the horses are loaned, the farmer will be able to use the horses to get ahead with other horse-work, and thus be able to manage any subsequent operations with his own horse strength.

(B) *FARMERS WHO HAVE LESS THAN EIGHT ACRES OF ADDITIONAL ARABLE LAND TO DEAL WITH.*

6. Where a farmer is unable to plough up and cultivate an additional area less than 8 acres in extent, without assistance, he should notify his District Committee, who, if satisfied that such assistance is necessary, should arrange to do so many "Horse-days" work for him in breaking up the land, or otherwise assisting him with seasonal horse-work on his farm or holding as he may be entitled to, on the basis of three days' work to be done for every acre of additional corn area.

7. The District Committee will arrange for the cultivation of these small areas of land by travelling gangs, who will be either ploughing, cultivating, harrowing, etc., as the season or condition of the land permits. Temporary centres must be arranged convenient for the

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* Not here printed.

work, where horses and implements can be accommodated and near which billets can be found for the ploughmen.

8. The number of teams in a gang will vary according to the programme it has to cope with, but small gangs of three or four teams should form a working unit and be placed in charge of a senior ploughman (to be paid 3*s* a week more than the others), who, besides working a team will be responsible for the men working proper hours, and for the good condition of the horses As far as possible a N C.O should be selected as senior ploughman, if possessed of the necessary qualifications.

9 The implements and horses with these travelling gangs must be temporarily accommodated in convenient centres, either on farms centrally situated for the area being worked, or in a village.

10 The District Committee must arrange the programme for the gangs in their area, and for someone to visit each gang at least once a week, to see that the work is progressing satisfactorily, and for the payment of the men's wages each week The senior ploughman must send a weekly return showing the land dealt with to the local representative nominated by the District Committee for his approval and transmission to the Executive Committee

11. For ploughing, cultivating or other work done, an inclusive charge must be made of 5*s* 6*d* per working day for each horse and the local rate of wages for the ploughman, as well as 1*s* per day for the use of the implements with each team On days when tillage operations cannot be undertaken steps should be taken to secure that the Government horses and ploughmen are employed on some other work for farmers or, failing this some other employer at equivalent rates

When a ploughman is working with a gang he should be paid by the Committee 1*s* a week in excess of the local rate of wages for a ploughman as his living expenses will usually be greater than when continuously working with a farmer

GENERAL INSTRUCTIONS

12 The soldier ploughmen supplied in connection with this scheme will be attached to an Agricultural Company stationed at an Agricultural Distribution Centre from which they will be sent out in the first instance to take over the horses at an Army Remount Depot, where the horses will be equipped with plough harness

13 Before a ploughman is drawn from the Distribution Centre a representative of the Committee should interview him to ascertain if he is used to ploughing If satisfied that he is suitable the Committee's representative should complete and hand to him a Reference Card (A) (F P 94) At the same time the Committee's Reference Card (B) (F P 95) is to be completed, and also the Card (C) (F P 96), which is subsequently to be sent to the Food Production Department The Committee's Reference Card (F P 95) should be retained in the offices of the Committee for reference, and all subsequent movements of the ploughman either to another employer or District Committee should be entered on this card The man's registration number will, in the case of soldiers, be his regimental number, and in the case of policemen, his police number

14 To avoid any hitch occurring when horses are drawn, a representative of the Executive Committee must attend at the Remount Depot to ensure that all necessary arrangements are made The horses

will be fitted with plough harness at the Depot, and it will be the duty of the Committee's representatives to see that the horses and harness are satisfactory before being despatched. Arrangements for any railway trucks necessary for the despatch by train of horses with necessary harness will be made by the Remount Officer, the Committee having previously informed him of the places of destination of the horses and the date on which it is desired they should be despatched. The Remount Officer will complete the Horse Reference Card (D) (F.P. 97) and hand it to the representative of the Committee. He will also complete the Horse Reference Card (E) (F.P. 98) and send it to the Food Production Department. The cards have been designed so that a record may be kept by the Committee of the exact location of each man and horse. It is essential that this record be kept fully and accurately.

15. The Agricultural Executive Committee must make the necessary arrangements for the ploughman to take over his team, and must supply him with the name and address of the person to whom he is to report himself. The Committee will also issue any railway warrant required for man and horses and notify the farmer of the day and probable time of arrival.

16. At least one clear week's notice must be sent to the Food Production Department by the Agricultural Executive Committee of the number of ploughmen, horses and implements required, and the date on which they wish them to be despatched. Committees should have in view sufficient work to keep each team fully employed before sending in a request for more men and horses.

17. Employers should be given as long notice as possible of the date on which a team will arrive, and the ploughman in charge of the team should also be informed at least seven days beforehand of the name and address of his next employer. Movement from one farm to another will usually take place by road, but in exceptional circumstances where railway transit is necessary railway warrants should be issued, and the necessary horse-box arranged for beforehand.

18. It is essential that no time should be wasted by men or horses. Committees should always reserve some non-urgent work in convenient localities, for instance, work on farms they have taken over, on which to employ teams temporarily disengaged. Accommodation for both men and horses should be arranged for provisionally in case intervals occur during which they are not employed.

19. Committees should arrange with Veterinary Surgeons in various parts of the county in order that their services will be available when required in the event of illness of, or injury to, any of the Government horses.

20. Periodical inspection of the horses loaned to the farmers or doing gang work should be arranged for in order to ensure that the horses are kept in good condition, and the harness in good repair.

21. Necessary repairs to saddlery and the purchase of additional horse tackle required should be arranged for locally by the Executive or District Committee. The Committee should arrange for any necessary repairs to farm implements under their control, and for plough shares and spare parts to be obtained from local firms.

22. Executive Committees may prescribe rations for horses loaned to farmers in any case where they deem it necessary. In the case of horses working in gangs, in order that the condition of the horses may

not be adversely affected by too frequent a change of rations owing to movements into new working centres, the Committee may arrange for corn, etc., to be supplied regularly from one source.

The Committee may fix according to the season the price to be paid by the District Committee to farmers and others for the stabling and feeding of horses employed on gang work. The price should not, however, in any case exceed 20s. per week at any period of the year if all provender is found by the person supplying the accommodation. Suitable deductions must be made therefrom for any corn, etc., supplied by Executive or District Committees.

23. When a team is on loan to farmers, the employer must insure the ploughman under the Workmen's Compensation Acts. It will not be necessary for men working directly under the Committee on gang work or on land taken over to be insured by them under these Acts. No Health Insurance Contributions will be payable. No Insurance of Horses will be necessary.

24. Executive Committees must send to the Food Production Department during the first week of every month a return on (F.P. 99) showing (*a*) the increased corn area dealt with by farmers to whom Government horses have been loaned, and (*b*) the increased corn area dealt with by horses working in gangs, together with a brief summary of receipts and expenditure under the scheme.

INSTRUCTIONS AS TO ACCOUNTS.

25. Charges for use of teams will be collected by the County Executive Committee and duly brought to account in the quarterly account rendered to the Department.

26. Payments by the Committee under this scheme will in similar manner be included, under appropriate heads, in the quarterly account.

27. It is anticipated that as a general rule "incomings" will be available to meet "outgoings," and consequently that the Committee will not need to apply to the Department for a grant in respect of these outgoings. If in any instance this should prove not to be the case, this Department will be prepared to place the Committee in funds to meet outgoings.

Local Supplies of Agricultural Implements and Harness.

A LETTER, dated 12th July, 1917, was addressed by the Food Production Department of the Board to Agricultural Executive Committees to the effect that:—

It is believed that it may be possible to obtain locally a proportion of the implements and equipments required for the tractors and horses which will be distributed during the next few months. The Department have placed large orders for ploughs, other implements and harness, but the present state of all manufacturing industries makes it difficult to obtain early delivery. This circumstance, apart from the desirability of making use of every implement and article of equipment already available, renders it necessary to purchase or bring into use whatever can be obtained locally and is in a serviceable condition. I am, therefore, to ask that the Agricultural Executive Committee will make inquiries and will furnish the Department with particulars of any ploughs or other implements required by your Committee which are actually available in the county, either in local dealers' stocks or on farms, and which are not in use at present. On receipt of this information the Department will authorise the Committee to purchase such proportion of their total requirements as is locally available and the balance will be procured by the Department from the manufacturers. If there is any quantity of second-hand implements which can be made serviceable, but to repair which labour is lacking, the Department will be glad to have the information in order that it may assist.

As regards harness, the Department to be informed of the desired approximate quantity of plough and thill harness which is locally procurable for any additional horses which may be sent to the county, and, with regard to second-hand harness, the Committee is requested to furnish suggestions as to the best method of putting it in repair.

It is considered essential that all purchases of implements and harness from manufacturers, as distinct from local agents, should be made by the Department, and that Committees should be careful to avoid purchasing or drawing upon supplies in the hands of dealers in other counties; otherwise competition and friction would result and would impede the equitable distribution throughout the country of the limited supplies available.

All purchases authorised under this procedure must be made in the name of the Department, and the accounts transmitted to 72, Victoria Street for payment.

THE following Notice, dated 1st August, 1917, has been issued by the Food Production Department:—

Supplies and Prices of Basic Slag for the Season, 1917-18.

Supplies.—The production of basic slag at the present time is being affected by the production of steel for munition purposes. The iron which is being used contains on the average a smaller percentage of phosphorus with the result that the slags which are now available for grinding have a lower phosphatic content. The supply of high-grade slag is therefore much less than was formerly the case.

All the suitable slag available is being ground, and the total tonnage is fully equal to what it was before the War. As no export is now allowed, the quantity available for home consumption is in fact much larger, though it is still below the demand.

In addition to the grades enumerated below, arrangements are being made in certain cases to grind a low-grade slag, which has not hitherto been used as a manure. It can be economically used on land within a moderate distance of the works.

In order that the available supplies of high-grade slag may be equitably distributed, makers who have only limited quantities of high-grade slag for sale are being advised to restrict their sales to any one buyer to approximately three-fourths of their sales of the same quality last year, and to ask buyers to take the balance of their order in a lower grade.

Farmers should not send orders to the works or firms mentioned below, but should obtain their supplies from the manure merchants, dealers, or co-operative societies from whom they usually purchase. They are recommended to place their orders at once, and to take the earliest possible delivery.

Prices.—The Food Production Department, in conjunction with the Ministry of Munitions, has come to an arrangement with makers in regard to the maximum prices to be charged by them. Inquiries have also been made as to the usual commission charged by dealers, and the prices given below indicate the rate at which farmers should be able to purchase basic slag excluding cost of delivery from the works to the farmers' nearest railway station. As dealers usually quote basic slag at a delivered price, the farmer is recommended, when purchasing, to ascertain the cost of delivery (*i.e.* haulage, sheeting, and any other charges) from the works to his nearest station, and after adding it to the price stated below to compare the resulting figure with the price asked by the dealer.

This Notice is only intended as a guide to farmers in making future purchases. It is not contemplated that contracts already made should be cancelled.

The divergencies which exist in some cases between the prices of nominally similar grades are understood to be due either to slight variations in the qualities produced by different works, or occasionally to the situation of the works.

Prices per ton including dealer's commission for lots of not less than 4 tons, free on rail at works, in maker's single 2-cwt bags, net cash.

Anglo-Continental Guano Works (London) :—
Citric Soluble—18 per cent, 55*s*, 20 per cent, 60*s*

British Basic Slag (Alberts' Successors), Limited. Works at Hawarden Bridge, Cradley, Brymbo, Etruria, Frodingham, South Bank, Park Gate, Wednesbury, Hollinswood and Middlesbrough :—
Citric Soluble—16 per cent., 44*s*.; 17 per cent., 45*s*. 6*d*.; 18 per cent, 47*s*.; 19 per cent., 48*s*. 6*d*.; 20 per cent., 50*s*., 21 per cent., 51*s*. 6*d*., 22 per cent., 53*s*.; 23 per cent, 54*s*. 6*d*., 24 per cent., 56*s*.; 26 per cent., 59*s*.; 28 per cent, 62*s* 6*d*.; 30 per cent., 66*s*. 6*d*; 32 per cent, 68*s*. 6*d*., 33 per cent., 70*s*. 6*d*.; 34 per cent., 72*s*.

Cwmfelin Steel and Tinplate Company (Swansea) :—
Citric Soluble—20 per cent., 52*s*. 6*d*.; 22 per cent., 54*s*. 6*d*.

The Baltic Basic Slag Company (Irlam, Manchester) :—
Total Phosphates—24 per cent., 54*s*.; 26 per cent., 56*s*. 6*d*.; 28 per cent., 58*s*. 6*d*.

Alexander Cross and Sons (South Bank, Middlesbrough and Scunthorpe, Lincolnshire) :—
Total Phosphates—17–20 per cent., 46*s*.; 20 per cent., 48*s*.; 22 per cent., 50*s*.; 24 per cent., 53*s*. 6*d*.

Alfred Hickman, Limited (Bilston, Staffordshire) :—
Total Phosphates—30 per cent., 62*s*. 6*d*.; 42 per cent., 80*s*.

The Leeds Phosphate Works, Limited (Hunslet, Leeds) :—
Total Phosphates—30 per cent., 62*s*. 6*d*.; 32 per cent., 66*s*.; 39 per cent., 74*s*.; 42 per cent., 80*s*.

South Wales Basic Slag Company, Limited (Pontardawe, Port Talbot and Panteg) :—
Total Phosphates—22 per cent., 50*s*.

Wigan Slag Phosphate Company (Middlesbrough and Wigan) :—
Total Phosphates—24 per cent., 56*s*.; 26 per cent, 58*s*.; 28 per cent., 60*s*.; 30 per cent., 62*s*.

It is to be understood that the cost of delivery from the works to the farmer's station must be added to the above prices in order to ascertain the delivered price The prices given do not apply to transactions in which credit is given

Prices for Smaller Quantities purchased ex *Merchant's Stores* —In the case of purchases made from the merchant's store the farmer should expect to pay the following additions to the above prices plus transport charges to cover storage and other charges —

For lots of 4 tons and over, 5*s* per ton
„ „ 1 ton, but less than 4 tons, 10*s* per ton
„ „ 2 cwt , „ „ 1 ton, 1*s* „ cwt
„ „ 1 „ „ „ 2 cwt , 2*s* „ „
, „ 28 lb , „ „ 1 „ 3*s* „ „

AN Order, dated 7th August, 1917 has been issued by the Ministry of Munitions to the effect that —

Blast-Furnace Dust

1 No person shall buy, sell, deal in or dispose of any blast furnace dust except under and in accordance with the terms of a licence issued on behalf of the Minister of Munitions by the Controller of Potash Production

2 No person shall treat any such dust so as to extract any component part thereof except under and in accordance with the terms of a licence issued as aforesaid

3 All persons producing or in possession of blast furnace dust shall make returns in regard to rate of production, stocks purchases sales, dealings or other matters relating to blast furnace dust in such form and at such times as may be required by the said Controller

4 Samples of any blast-furnace dust produced by or in the possession of any person shall be furnished to the said Controller by such person in such form and quantity and at such times as the said Controller may prescribe Such samples shall be taken in such manner as the said Controller or his authorised representative may prescribe

5 For the purpose of this Order blast furnace dust shall mean dust deposited or otherwise derived from the gases of any furnace used for treating ores for the production of iron or any of its alloys

6 All applications in reference to the above Order should be made to the Controller of Potash Production, Ministry of Munitions, 117, Piccadilly, W 1

Farmers and Tractors.

IN view of apparent misunderstandings in some quarters it is thought desirable by Sir Arthur Lee, Director-General of Food Production, to make clear the policy of the Food Production Department with regard to agricultural tractors and other implements

"The Cabinet having decided that a large increase must be made in the acreage under corn and potatoes for the harvest of 1918, it has been the duty of the Food Production Department, acting through the Agricultural Executive Committees to apportion the task between the different parts of the country, and to see that the best use is made of existing resources in the way of labour, horses, machinery and other requisites

"In this connection the first object aimed at is to ensure that farmers throughout the country make the fullest use of the resources actually at their disposal or procurable in the ordinary ways, and it is in no sense the policy of the Department to relieve agriculturists of any portion of the national task which they are able to perform themselves To accomplish the full programme, however, it is inevitable that the Department, acting through the War Agricultural Committees will have to assume responsibility for that residue of the task which is beyond the power of the farmers to carry out unaided

"It is for this purpose, and for this purpose alone, that the Department is obtaining, and placing at the disposal of the County Committees, a large number of tractors, horses and other requisites (with such additional labour as can be procured), and arrangements have already been made for the purchase or loan of the full quantities required, with a substantial margin for wastage and other contingencies Owing to shipping difficulties, conflicting demands for labour, and other war troubles, considerable delays have been experienced in securing those extra resources, but these delays are being gradually overcome; and it is anticipated, with regard to tractors especially, that deliveries will greatly improve in the near future

"This does not imply, however, nor is it desirable, that the Food Production Department will ever be in a position by means of Government tractors, to relieve farmers of ploughing and other work which they are able and expected, to carry out themselves On the contrary, it is desired and anticipated that farmers and others will make every effort to equip themselves, at their own expense, with whatever additional resources they may need in the way of tractors implements horses and other requisites In this way alone can the full national task be accomplished, for, however big the Government effort may be, it can be no part of its object to relieve agriculturists of their proper responsibilities"

AN Order, dated 14th August, 1917, has been made by the Food Controller to the effect that —

The Winter Oats and Rye (Restriction) Order, 1917.

1 Except under the authority of the Food Controller no person shall before the 1st November, 1917, use any winter sown winter oats (hereinafter called winter oats) grown in the United Kingdom in the year 1917 or before the 1st January, 1918, use any rye so grown for any purpose other than seed

2 So long as the restrictions imposed by Clause 1 are in force, no person shall buy or otherwise acquire any winter oats or rye unless either he being a person who ordinarily deals therein for seed purposes acquires them with a view to re sale, or he requires them for the purpose of seed,

3 So long as the restrictions imposed by Clause 1 are in force no person shall sell or otherwise dispose of any winter oats or rye except to a person who ordinarily deals therein for seed or to a person who is reasonably believed to require them for the purpose of seed

4 Nothing in this Order shall affect the use of any winter oats in Scotland or in Ireland or any transaction affecting winter oats taking place in Scotland or Ireland

AN Order, dated 31st July, 1917, has been made by the Food Controller to the effect that —

The Milk (Returns) Order, 1917.

All persons engaged in the production, purchase, sale distribution, transport, or storage of any milk, shall furnish particulars as to their businesses as may from time to time be specified by or on behalf of the Food Controller and shall verify the same in such manner as he may direct

AN Order, dated 28th July, 1917, has been made by the Food Controller to the effect that —

The Cattle and Meat (Returns) Order, 1917.

1 All persons engaged in the production, purchase, sale, distribution, transport, storage or shipment of any cattle or any meat, shall furnish such particulars as to their businesses as may from time to time be specified by or on behalf of the Food Controller and shall verify the same in such manner as he may direct

2 For the purpose of this Order the expression "cattle" shall include, in addition to cattle usually so called, ram ewe wether lamb, deer, goats and swine, and the expression 'meat' shall mean any meat obtained from cattle as defined

AN Order dated July 28th, 1917, has been made by the Food Controller to the effect that —

The Winter Beans Order, 1917.

1 A person shall not before the 1st December, 1917 use any winter sown winter beans grown in the United Kingdom in the year 1917 (hereinafter called winter beans) for any purpose other than seed

2 A person shall not before the 1st December, 1917, buy or otherwise acquire any winter beans unless either he, being a person who ordinarily deals in winter beans for seed purposes, acquires them with a view to re sale for such purpose, or he requires winter beans for the purpose of seed, and unless, in either case, he gives to the person from whom he acquires the winter beans a certificate stating the purpose for which such beans are required.

3 A person shall not before the 1st December, 1917, sell or otherwise dispose of any winter beans to any person except to a person who ordinarily deals in winter beans for seed, or to a person who is reasonably believed to require such beans for the purpose of seed, and who in either case gives such a certificate as is referred to in the preceding clause

4. Every certificate given under this Order shall contain the name and address of the person giving such certificate and shall be retained by the person to whom it is given All such certificates shall at all times be open to the inspection of any person authorised by the Food Controller or by a Local Authority empowered to enforce this Order, or, as respects England and Wales, by the Board of Agriculture and Fisheries, or, as respects Scotland, by the Board of Agriculture for Scotland.

5 It is also stated that nothing in this Order shall affect the use of any winter beans in Ireland or any transaction taking place in Ireland.

AN Order, dated 31st July, 1917, has been made by the Food Controller to the effect that:—

The Flour Mills Order No. 2, 1917.

1. The provisions of Regulation 2GG* of the Defence of the Realm Regulations are hereby applied as from the close of business on the 11th August, 1917,

(*a*) to every flour mill in the United Kingdom, which uses any wheat in the making of flour or meal (hereinafter referred to as a flour mill), except a mill to which the Flour Mills Order, 1917,* applies; and

(*b*) to every provender and grist mill connected with any flour mill as part of the same establishment.

2. Every person having the management or control of a flour mill shall before the 7th August, 1917, forward to the Food Controller, Grosvenor House, London, W. 1, particulars of the name or names of the proprietor or proprietors and postal address of the mill, and the hourly and weekly output capacity of the mill for the production of flour.

3. From and after the 11th August, 1917, no person shall grind wheat except at a mill in respect of which the particulars required by the foregoing clause have been furnished.

4.—(i.) Every person having the control or management of a flour mill shall keep such records relating to grain received, held and used, and relating to the operations of the mill as the Food Controller may from time to time direct, and shall make such returns relating to the operations of the mill as the Food Controller may from time to time require.

(ii.) All records and documents kept in accordance with this clause shall upon any request in that behalf be produced to and open to the inspection of any person authorised by the Food Controller.

AN Order, dated 17th July, 1917, has been issued by the Army Council to the effect that:—

Prohibition of the Lifting of Hay and Straw in Great Britain and Ireland and the Isle of Man.

1. The Army Council hereby give notice that all hay or oat or wheat straw now standing in bulk in Great Britain and Ireland and the Isle of Man, or as and when harvested is taken possession of by the Army Council and shall from the date of this Order, or as and when harvested, be held at the disposal of the duly authorised Officers of the War Department, excepting such hay or straw of the 1916 or earlier crop as has been released by Sale Licence. The Army Council Orders of the 30th June, 1916,† and the 14th September, 1916,‡ relative to the prohibition of the lifting of hay and straw in England, Wales and Ireland, in Great Britain, in Scotland, and in the Isle of Man respectively are hereby cancelled.

2. Applications to enable hay or wheat or oat straw to be sold to private consumers or dealers will only be granted in respect of qualities and quantities of hay or straw in respect of which a Sale Licence has been issued being found not to be required for Army use, and that part of the Army Council Order of 9th May, 1917,§ prohibiting the use of

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* See *Journal*, May, 1917, p. 230. † See *Journal*, Aug., 1916, p. 511.
‡ See *Journal*, Oct., 1916, p. 705. § See *Journal*, June, 1917, p. 364.

straw for certain purposes, in so far as it relates to wheat straw in Great Britain, and in so far as it relates to oat straw in Scotland, is cancelled.

3. Farmers and stock breeders are authorised to use a reasonable quantity of hay or oat or wheat straw in their possession for consumption by stock in their possession or control.

4. Applications for sale under this Order must be made in writing to the District Purchasing Officer of the district or county in which the hay or straw affected is standing.

5. Applications to purchase for the purpose of re-sale will be made in England and Wales and the Isle of Man to the Administrative Member, Forage Committee, 64, Whitehall Court, London, S.W. 1; in Ireland to the Area Administrative Officer, Royal Hospital, Dublin; and in Scotland to the Area Administrative Officer, Carlton Hotel, Edinburgh.

6. All Licences or Authorities issued under this Order will be issued subject to the restrictions and conditions contained in such Licences or Authorities; any departure from these conditions or other act in contravention of the provisions of this Order will be an offence under the Defence of the Realm Regulations, and render the offender liable to the penalties attaching thereto.

7. Detailed instructions regarding the necessary procedure to be adopted by all desiring to sell, purchase or remove hay or straw under this Order can be obtained on application to the Secretary, Forage Committee, 64, Whitehall Court, London, S.W. 1; in Ireland to the Area Administrative Officer, Royal Hospital, Dublin; in Scotland to the Area Administrative Officer, Carlton Hotel, Edinburgh; and in the Isle of Man to the D.P.O.S., Edinburgh House, Loch Promenade, Douglas.

Regulations of the Sale of Hay and Oat and Wheat Straw, and of Chopped Hay and Oat and Wheat Straw in Great Britain, Ireland and the Isle of Man.

An Order, dated 17th July, 1917, has been issued by the Army Council to the effect that:—

That on any sale of hay, oat straw or wheat straw, or chopped hay, oat straw or wheat straw in Great Britain and Ireland and the Isle of Man, the price shall not exceed such prices as are set out in the Schedules hereunder:—

SCHEDULE I.

(Long Hay and Straw.)

Maximum Prices per Ton which a Producer may not exceed.

——		Hay.	Oat Straw.	Wheat Straw.
		£ s. d.	£ s. d.	£ s. d.
To 31st December, 1917	..	5 10 0	3 0 0	2 10 0
,, 31st January, 1918	..	5 12 9	3 1 6	2 11 3
,, 28th February, 1918	..	5 15 6	3 3 0	2 12 6
,, 31st March, 1918 ..	..	5 18 3	3 4 6	2 13 9
After 31st March, 1918	..	6 1 0	3 6 0	2 15 0

The above prices are deemed to include the cost of carting to nearest railway station or a distance equivalent thereto, but not the cost of cutting, trussing and tying, or baling.

SCHEDULE II.

(LONG HAY AND STRAW.)

Maximum Prices per Ton for quantities exceeding 10 cwt. which a Seller may not exceed.

—	Hay.			Oat Straw.			Wheat Straw.		
	£	s.	d.	£	s.	d.	£	s.	d.
To 31st December, 1917 ..	7	10	0	5	0	0	4	10	0
,, 31st January, 1918 ..	7	12	9	5	1	6	4	11	3
,, 28th February, 1918 ..	7	15	6	5	3	0	4	12	6
,, 31st March, 1918	7	18	3	5	4	6	4	13	9
After 31st March, 1918 ..	8	1	0	5	6	0	4	15	0

The above prices are deemed to include commission and all costs and charges incurred, of whatever nature, for hay and straw delivered on to the consumer's or purchaser's premises.

SCHEDULE III.

(LONG HAY AND STRAW.)

Maximum Prices per Stone of 14 lb for quantities of 10 cwt. or less, which a Seller may not exceed.

—	Hay.		Oat Straw.	Wheat Straw.
	s.	d	d.	d.
To 31st December, 1917 ..	1	0	8½	7½
,, 31st January, 1918 ..	1	1	9	8
,, 28th February, 1918 ..	1	1	9	8
,, 31st March, 1918	1	2	9½	8½
After 31st March, 1918 ..	1	2	9½	8½

The above prices are deemed to include commission and all costs and charges incurred, of whatever nature, for hay and straw delivered on to the consumer's or purchaser's premises

SCHEDULE IV.

(CHOPPED HAY AND STRAW.)

Maximum Prices per Ton for quantities exceeding 10 cwt. which a Seller may not exceed.

—	Chopped Hay mixed with 20 per cent. of Chopped Straw.			Chopped Oat Straw.			Chopped Wheat Straw.		
	£	s.	d.	£	s.	d.	£	s.	d.
To 31st December, 1917 ..	7	10	0	5	0	0	4	10	0
,, 31st January, 1918 ..	7	12	9	5	1	6	4	11	3
,, 28th February, 1918 ..	7	15	6	5	3	0	4	12	6
,, 31st March, 1918	7	18	3	5	4	6	4	13	9
After 31st March, 1918 ..	8	1	0	5	6	0	4	15	0

The above prices are deemed to include commission and all costs and charges incurred, of whatever nature, for "chop" delivered on to the consumer's or purchaser's premises, excepting that where it is delivered in returnable sacks or bags a sum equal to *7s. 6d.* per ton may be added to the above prices.

SCHEDULE V.

(CHOPPED HAY AND STRAW.)

Maximum Prices per Stone for quantities of 10 cwt. or less which a Seller may not exceed.

—	Chopped Hay mixed with 20 per cent. of Chopped Straw.		Chopped Oat Straw.	Chopped Wheat Straw.
	s.	*d.*	*d.*	*d.*
To 31st December, 1917 ..	1	0	8½	7½
,, 31st January, 1918 ..	1	1	9	8
,, 28th February, 1918 ..	1	1	9	8
,, 31st March, 1918	1	2	9½	8½
After 31st March, 1918 ..	1	2	9½	8½

The above prices are deemed to include commission and all costs and charges, of what evernature, for "chop" delivered on to the consumer's or purchaser's premises, excepting that where it is delivered in returnable sacks or bags an additional *½d.* per stone may be added to the above prices.

The Army Council Orders of the 5th November, 1916,* the 27th February, 1917,† and the 14th March, 1917,‡ regulating the price of hay and straw and "chopped" hay and straw are hereby cancelled.

Nothing in this Order shall affect the Army Council Order of the 9th May, 1916,§ regulating the sale, etc., of chopped hay and straw, and the prohibition of the use of oat straw for certain purposes in England and Wales ||

AN Order, dated 12th July, 1917, was issued by the Army Council to the effect that :—

The Flax Seed (Ireland) Order, 1917.

1. It shall be the duty of every grower of flax in Ireland during the season of 1917 .

(1) To dry, with the object of saving the seed therefrom, in such manner as may be prescribed by the Department of Agriculture and Technical Instruction for Ireland, one-eighth of the total crop grown by him, such portion of one-eighth to be selected so as to represent the fair average of the crop.

(2) To stack such portion of the crop in the manner prescribed by the said Department.

(3) To de-seed same at such time and in such manner as may be prescribed by the said Department, and to comply with any directions given by the said Department in that behalf, and as to the subsequent disposal of the seed so removed.

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* See *Journal*, December, 1917, p. 902. † See *Journal*, March, 1917, p. 1294

‡ See *Journal*, April, 1917, p. 110. § See *Journal*, June, 1917, p. 364.

|| See also preceding Order, par 2.

Provided, that if the entire crop is, with the approval of the said Department, sold on foot or in a dried condition, and the grower thereof has obtained from the purchaser an undertaking on the form set out in Schedule A hereto annexed,* the grower shall be relieved of all duty with regard to the stacking or de-seeding of the flax so sold, and such duty shall devolve on the purchaser giving the aforesaid undertaking.

2. Except as hereinbefore provided, no person shall, without a permit issued by the said Department, sell, offer for sale, purchase, make payment for or take delivery, whether for scutching or otherwise, of any flax grown in Ireland during the season 1917, unless and until he has made or obtained, as the case may be, a declaration in the form set out in Schedule B* hereto annexed.

3. No person shall sell or dispose of the seed removed from the said portion of one-eighth of the crop otherwise than to persons duly authorised by the said Department, and it shall be the duty of all such persons to comply strictly with any directions that may be given by the Department with regard to the acquisition, removal or handling of or payment for such seed.

Horses (Prohibition of Exportation from Ireland) Order, 1917.

THE Department of Agriculture and Technical Instruction for Ireland have issued an Order, dated the 14th July, providing that, on and after the 21st July, 1917, no horse shall be exported from Ireland, or be caused or permitted by its owner, or his agent, or by the person in charge of the horse, or by the owner or the master of any vessel, to be so exported, or to be placed on board a vessel for the purpose of exportation.

This prohibition, however, is not to apply to :—

(*a*) Any horse shipped under military authorisation, whether attached to a military unit or otherwise ; or

(*b*) Any horse the exportation of which is authorised by a licence granted by the Department of Agriculture and Technical Instruction for Ireland, or by an officer authorised in that behalf by the Department, provided that the terms of such licence are duly complied with.

Sale of Horses Order, 1917.

THE following Circular Letter, dated 20th July, 1917, has been addressed by the Food Production Department of the Board to the County Agricultural Executive Committees and County Borough Councils in England and Wales and the London County Council :—

SIR,—With reference to the Circular Letter (No. F.P. 75),† the Board have had under consideration the various representations which have been received in connection with the Sale of Horses Order.

The urgent need of agricultural horses for land cultivation will not admit of the withdrawal of the Order, but I desire to point out that the Order is intended to apply only to agricultural horses suitable for the purpose of cultivating the land, and that discretionary power is vested in the Agricultural Executive Committees with regard to the issue of licences in exceptional cases such as stallions, brood mares and valuable fillies under three years old which are registered in the Stud Book.

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* Not here printed.

† See *Journal*, July, 1917, p. 471.

No licence is considered to be necessary for ponies and cobs.

It is not essential that the name of the purchaser should be inserted in the licence at the time of issue, as this can be done after the purchase is completed in accordance with any conditions under which the licence is granted.

The Board are proposing to purchase immediately a large number of horses in connection with the scheme for increased cultivation for the 1918 harvest, so that farmers should find no difficulty in disposing of any surplus horses.

I am, etc ,
ARTHUR LEE,
Director-General.

Cartridges and Shot[*]

THE following Memorandum, dated 23rd July, 1917, has been sent by the Food Production Department of the Board to Agricultural Executive Committees in England and Wales —

Representations have been made that the restrictions on the sale of shot-gun ammunition will have a detrimental effect on the supply of food and on the preservation of crops. It has been urged that in most parts of the country it has been an exceptionally good breeding season, and that if no facilities are allowed for shooting game a substantial supply of food will be lost and considerable damage may be done to the crops in the autumn. It has also been found that Committees are finding great difficulty in arriving at any satisfactory basis on which licences to purchase cartridges should be issued.

The matter has therefore been reconsidered by the Army Council, the Boards of Agriculture for England and Scotland, the Ministry of Food, and the Ministry of Munitions, and it has been decided that the Army Council Instruction No. 945 of 1917 shall be withdrawn, so that in future no licence will be required for the purchase of cartridges by farmers or others.

Agricultural Executive Committees are therefore relieved from the duty of dealing with applications for licences, and applicants should be informed that the restrictions are being withdrawn.

It must be understood, however, that owing to the shortage of lead the Ministry of Munitions cannot undertake to supply material for the manufacture of any more cartridges, and consequently users and retailers should be urged to exercise all possible care and economy in the disposal of the existing stocks.

The Grouse and Black Game (England and Wales) Order, 1917

AN Order, dated 3rd August, 1917, has been made by the Board of Agriculture and Fisheries authorising the killing and taking, the sale and purchase, and the possession of grouse and black game in England or Wales, at any time between 6th August (including that day) and the date at which any of these things would become lawful in the current year if this Order had not been made, by any person who would be entitled to do any of these things after the last-mentioned date

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[*] See also *Journal*, May 1917, pp. 252, 253.

The Killing of Certain Migratory Wild Birds.

THE Board of Agriculture and Fisheries have made an Order, dated 31st July, 1917, authorising in England and Wales the killing, on and from 1st August until the next close season, of certain migratory wild birds, with a view to increasing the food supply of the country. The birds to which the Order applies are: curlew, knot, whimbrel, golden plover, red shank, godwit, snipe, woodcock, teal, widgeon, mallard, shoveler, pochard, pin-tail, brent goose, barnacle goose, pink-footed goose, white-fronted goose, and grey lag goose The Order does not authorise persons to kill such birds in contravention of their tenancy agreements, or on land or water on which they are not entitled to kill the birds; nor does it exempt any person from the provisions of the Gun Licence Act, 1870.

The Hop Crop of 1917.

THE following Notice, dated 2nd August, 1917, has been issued by the Board of Agriculture and Fisheries:—

A scheme has now been approved by the Government by which the crop of hops grown in 1917 will be taken over by a Committee of Management acting under the Board of Agriculture. Full particulars will be published as soon as some outstanding details have been settled. The main feature of the scheme, however, is that the Managing Committee will be in a position to purchase from all growers the hops they pick this year, and to pay them immediately a price designed to cover the cost of production. The grower will have to wait for the balance of the price, *i.e.* his profit, until the hops can be realised and the expenses of management paid off. No grower will be allowed to pick more than 50 per cent of his 1914 acreage, to which the Order in Council of 19th May* referred. These will be the main provisions. The details of management cannot be settled until after the appointment of the Managing Committee, on which the hop growers and other trade interests concerned will be properly represented.

Poultry Advisory Committee.

THE following Notice, dated 9th August, 1917, has been issued by the Board of Agriculture:—

The Poultry Advisory Committee of the Board of Agriculture is at present considering a scheme for the preservation of the best flocks in the country should a drastic reduction of the poultry stock become necessary owing to the operations of enemy submarines.

Poultrymen may be interested to know that since 8th June, when the Committee first met, resolutions on the following subjects have been submitted by the Committee to the President of the Board of Agriculture and Fisheries:—

(1) Reservation of a sufficient quantity of oats for use in poultry food, should further restrictions on the use of cereals for feeding poultry become necessary.

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* See *Journal*, June, 1917, p. 371.

(2) Price of wheat screenings, tailings, and damaged grain, whether English or foreign, compared with the price of sound grain.

(3) The Board's Scheme for distributing sittings of eggs of approved strains.

(4) Establishment of an office to decide whether samples of grain submitted for examination are unfit for human consumption and may be used for poultry feeding.

(5) Reduction in the percentage of extraction in the milling of maize in order to increase the value of the by-product as food for poultry.

(6) Economic reduction of existing poultry stocks.

(7) Selling of poultry foods by weight and the adoption of the hundredweight (112 lb.) as the standard weight.

(8) Selling of poultry foods without admixture of foreign substances, such as grit.

(9) Reservation of a certain quantity of maize for poultry feeding at fixed prices both to the merchant and consumer.

(10) Fixing price of mill screenings to retailers.

(11) Importation of eggs and fowls.

(12) Continuation of scientific hatching experiments.

(13) Exemption of expert poultrymen from military service.

Railway Transport: Perishable Fruit.

IT has been brought to the notice of the Food Production Department that in certain parts of the country fruit growers have experienced serious difficulty in securing the railway facilities necessary for the prompt marketing of perishable fruit. The Department is prepared to do all in its power to assist fruit growers in obtaining the necessary facilities, and in order that the Department may give this assistance, fruit growers who are experiencing difficulties in putting their fruit on rail should communicate immediately with the Food Production Department, 72, Victoria Street, Westminster, S.W. 1.

Harvest Weather Forecasts.

THE Meteorological Office will, as in past years, but subject to certain restrictions, supply forecasts of weather by telegraph to persons desirous of receiving them, upon payment of a registration fee of 1*s*. and the cost of the telegrams, computed at 9*d*. per day. The supply of forecasts will continue until 30th September. The forecasts are drawn up each week-day at 3.30 p.m., and refer to the probable weather during the 15 hours from 6.0 a.m. to 9.0 p.m. on the next day. The addition of a "further outlook" and the issue of notifications in connection with spells of settled weather are suspended during the War.

Applications for the forecasts should be sent to the Director, Meteorological Office, South Kensington, London, S.W., with a cheque or postal order payable to the Meteorological Committee, to cover the cost of the telegrams for the period, which should not be less than 6 consecutive days, during which the forecasts are to be sent.

Food Conservation.

ALTHOUGH very little has been said publicly in the Press or elsewhere about the measures that are being taken by the Food Production Department to prevent the waste of surplus fruit and vegetables, a great deal of work in this direction has been done quietly during the past three or four months Of course, war conditions have militated against the setting up of so complete a scheme as would have been possible had the question of food conservation been adequately attended to in peace time However, an organisation sufficiently effective and widespread has been built up to encourage the belief that the surplus of home grown food will this year be handled on far sounder and more economical lines in England and Wales than ever before

A brief outline of the plans of the Food Production Department now maturing for the treatment of surplus fruit and vegetables may prove of interest to the general public

In the first place, after a rapid but fairly exhaustive survey of the chief fruit- and vegetable producing areas, the Department set about securing suitable premises for conversion into pulping and drying works. The process of pulping, it may be explained, consists in the reduction of fruit to its smallest possible proportions, in a moist, storable condition without the use of sugar, this pulp being capable at any time afterwards of utilisation in jam making, confectionery, etc, by the mere addition of the necessary sugar or sugar substitute The process of drying consists in the extraction by heat of all superfluous moisture from fruit or vegetables so that they can be stored for an unlimited period or carried to the points at which they may be required in a condition which renders their transport easy It will be obvious that if hundreds of thousands of tons of fruit and vegetables can be treated within marked areas say, of 25 miles each, a vast bulk of cheap and nutritious food will be reserved for winter use and a heavy burden removed from the long-distance railway traffic of the country

In some districts the schemes of the Department, on being explained to local growers, were welcomed with enthusiasm as an important step towards the solution of a very serious problem, in others their necessity was openly doubted For example, in one or two notable plum producing areas, it was stated as recently as eight weeks ago that there could not conceivably be a surplus of plums this year During the past week Covent Garden reported a glut of this fruit, and consignments were thrown back on the growers' hands in one of these areas Immediately they appealed to the Department to accept the fruit The officials took the matter in hand at once, and arrangements are now being made for buildings in the locality for use as pulping and drying factories In some districts owing to the prohibition of the importation of foreign apples, the growers to-day are asserting with equal conviction that there can be no surplusage of apples in the country this year Doubtless this is true so far as concerns the winter keeping varieties, but there seems every likelihood that in more than one neighbourhood the Department's pulping factories will be called upon to deal with a surplus over immediate market requirements (at a fair price) of apples of varieties that do not keep satisfactorily.

The Branch of the Food Production Department dealing with this matter intends to establish at least one pulping or drying or pulping and drying plant in each of the chief producing districts, and the preliminary arrangements have been made in every county where surpluses are likely to occur In many of the counties the works are already in existence; at Cheltenham, among other places, they are actually pulping surplus fruit. The supplies handled, it should be clearly understood, are additional to those covered by the scheme of controlled jam making establishments working under the ægis of the Contracts Department of the War Office; indeed, special attention has been paid to the avoidance of overlapping, as well as to a proper economy in the details of the plans which are being carried out by practical men skilled in market methods and food conservation.

To deal immediately with the pulping of plums, centres are already in existence or will be opened by the end of the month at Cambridge, at Bewdley and Pershore in Worcester, at Cheltenham in Gloucestershire, at the Harper Adams Agricultural College in Shropshire, at Maidstone Sittingbourne, and Marden in Kent, and at Chester. It may be worth mentioning that the services of the agricultural and horticultural college authorities all over the country are being utilised advantageously. For instance, the drying scheme in Kent will be attended to from Wye College, whose experts have a close personal knowledge of the county. Farmers' co-operative societies and market-growers' associations are also being brought into intimate touch with the scheme—notably at Cheltenham and Marden. Allotment men smallholders, and others with little lots of surplus produce, are being asked to bulk it and send it along to be pulped or dried. For instance, at Dittisham in Devon, the vicar and a few others are acting informally as a forwarding committee for the small local growers of plums; and other societies or groups are acting as purchasing agents in their neighbourhoods.

For the apple crop, pulping stations are being established or are contemplated at Plymouth, Totnes, Crediton, Newton Abbot, Tiverton, Bridgwater, and Wedmore near Cheddar. Drying centres so far established include Cheltenham and Pershore, at both of which places plots have been taken and machinery is now in process of installation. At least two others stations will be opened shortly in Worcestershire and plans are in existence for covering a large number of other counties—practically every county where intensive cultivation is practised. The Department has also interested a number of large private firms in the twin industries of pulping and drying, and several of them are already dealing with fruit and vegetables at their existing factories as well as building other factories for an enlarged output.

Apart from these special activities on the large scale the Food Production Department is suggesting more or less successfully to local allotment and smallholding societies that they should follow the lead of the Norwich Food Production League, the Criccieth Women's Institute and smaller societies, and dispose by local marketing of such tiny surpluses as may not (even when bulked) warrant their putting on rail or motor for transport to a pulping or drying centre. Through the agency of the co-operative agricultural movement and in other ways many small village growers are being placed in touch with markets in the form of individual buyers or societies in the nearest town. Home canners, cans and bottles, are being supplied through the Department for the use of individuals, or groups of individuals, who may prefer to preserve their own fruit or vegetables; demonstrations are being given all over the country in sugarless jam making, bottling, canning, and the oven-drying of fruit and vegetables. Free leaflets on all these subjects as well as on the storage of vegetables for winter use, are being distributed systematically; and many lectures are delivered daily up and down the country on the same subjects.

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad

The *International Crop Report and Agricultural Statistics* for July, 1917, published by the International Institute of Agriculture, gives the following estimates of the condition of the cereal crops in the Northern Hemisphere 100 being taken to represent the average yield during the last 10 years *Wheat*—Denmark 80, Spain 100, England and Wales 94 Scotland 95, Ireland 95, Sweden 89, Switzerland 100, Canada 95 *Rye*—Denmark 65 Spain 100, Ireland 100, Sweden 75 Switzerland 98 Canada 94 *Barley*—Denmark 80 England and Wales 98 Scotland 105 Ireland 100 Sweden 94 Spain 100 Switzerland 100, Canada 98 *Oats*—Denmark 88, Spain 100, England and Wales 93 Scotland 100, Ireland 95 Sweden 94 Switzerland 95 Canada 97

Canada.—According to reports dated 13th and 20th July, received from the Census and Statistics Office at Ottawa, the total area sown with wheat this season is 13 450 250 acres, compared with 14,897,000 acres last year, being nearly 10 per cent less than that sown, but about 4 per cent more than that harvested in 1916 Of the total area under wheat 809 250 acres were sown last autumn and 12,641,000 acres in the spring The area sown with oats is 11,000 806 acres, compared with 11,370,340 acres last year barley 1,819 900 acres compared with 1,827,780, rye 153 900 acres compared with 147 170 whilst hay and clover is put at 7 661 800 acres against 7 892 932 acres in 1910 Every province shows an increase in the area planted with potatoes and it is estimated that there are 502 400 acres under this crop

United States. The Crop Reporting Board of the Department of Agriculture states in a report, dated the 8th August, that the preliminary returns now indicate a yield of winter wheat of about 15 1 bush per acre or a total of 417 000 000 bush compared with 13 6 bush and 482 000,000 bush respectively the final estimate of last year's crop, spring wheat 12 5 bush, and 230 000 000 bush compared with 8 8 bush and 158,142 000 bush barley 21 8 bush and 203 000,000 bush compared with 24 4 bush and 181,000 000 bush oats 33 6 bush and 1,456 000 000 bush compared with 30 1 bush and 1 252,000 000 bush maize 26 3 bush and 3 191,000 000 bush compared with 24 4 bush and 2,583,000 000 bush last year The yield of potatoes is estimated at 467 000 000 bush against 285 000 000 bush raised last year The yield of hay is estimated at 100,000 000 tons (*Broomhall's Corn Trade News, 9th August*)

Holland.—A report received from His Majesty's Consul-General at Rotterdam on the condition of crops on 19th June states the weather during May and the first half of June was warm and dry and winter cereals has improved The hay crop will be short, having suffered from the drought The general condition of winter wheat is slightly better than normal, winter barley moderate to fairly good, winter rye, summer wheat, summer barley and oats varying between fairly good and good A good yield of potatoes is expected

Denmark.—His Majesty's Minister at Copenhagen reported on 24th June that the prospects at present are that wheat, barley, oats, rye and potatoes will be below average, while the hay crop is generally bad, but favourable weather might bring about a great change before harvest.

India.—A cable received from Karachi on the 30th July, gives the final estimate for the wheat crop in the North-West Frontier Provinces The area sown amounted to 1,050,000 acres, and the yield to 277,000 tons (1,293,000 qr) against the previous estimate of 239,000 tons (1,115,000 qr) or an increase of 178,000 qr (*London Grain, Seed and Oil Reporter*, 30th July)

Russia.—His Majesty's Commercial Attaché at Petrograd states that according to official reports published in the Trade Gazette of 10th June, 25th June, and 8th July, the probable area under beet this season is estimated at 1,099,912 acres as compared with 1,497,371 acres last year, a decrease of 26 5 per cent The condition of winter and spring grain crops in European Russia is generally satisfactory, though not uniformly so

Agricultural Conditions in England and Wales on 1st August

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st August, state that the weather during July was mostly warm and dry until the end of the month when rain set in and that the conditions were generally favourable to the crops on the whole, especially in the west

Wheat shows some improvement during the month it is considerably better in the west than in the east of the country prospects varying from about average in the counties bordering on the Severn to nearly 10 per cent below in Lincoln and Norfolk Barley is quite the best of the corn crops, but promises to be over average only in the west and north Oats are a variable but poor crop prospects being much worse in the eastern corn growing districts but quite average or even over in Wales and the north west The two latter crops more particularly have been a good deal knocked about by the storms at the end of the month Beans appear to be the worst crop of the year, especially in the east, peas are better, but not up to the average

Potatoes are everywhere very promising no district anticipates a yield below average and in many areas in the south they are expected to yield 10 per cent above the mean There is a certain amount of disease in the south west but in the rest of the country very little is reported

Roots are healthy and promising All through the dry period of the month fly was very troublesome, many fields had to be resown, and a good deal of difficulty was experienced in getting a plant The rain towards the end came in time to effect a material improvement Mangolds were suited by the weather, and a further advance may be noted in their prospects, which are everywhere above average, except in the extreme north

Hops are generally reported to have done well, and the yield will, it is hoped be a little above average although not quite to the extent that was anticipated a month ago Very little mould or insect attacks were reported until towards the end of the month, and less washing than usual has in most areas been necessary

The hay was generally secured in very good condition during the fine weather although in several districts hay making was protracted owing to interruptions by rain, and some late hay is not satisfactory The quantity is below average and less than was anticipated a month ago In many parts of the west and north it is up to the average, or even over but over most of the country, especially the east, it is very short The yield of hay from clovers and rotation grasses is not so far short of the average as that from meadows

Of small fruit, strawberries have yielded nearly an average crop, but gooseberries raspberries and currants have all given very good yields. From Kent it is reported that the trees have recovered somewhat from the attacks of caterpillars, which have done a good deal of damage in many places. In spite of this however all orchard fruit is expected, in England as a whole to be above the average pears being particularly abundant.

Pastures were in many districts burnt up by the drought and in such areas live stock only did moderately well. Other parts of the country however had sufficient rain and pastures and live stock accordingly did better. The rain at the end of the month was everywhere very beneficial.

Labour is still very deficient but soldiers and women were largely employed throughout the country, and farmers generally managed to get the urgent work done. In many districts also the fine weather shortened the hay making.

Summarising the returns and expressing an average crop by 100 the appearance of the crops on the 1st August indicated probable yields per acre which may be denoted by the following percentages: Wheat 95 barley, 99 oats 93 beans 85 peas 94 potatoes 105 mangolds 102 seeds hay 96 meadow hay 91, and hops 101.

Agricultural Labour in England and Wales during July

The following local summaries give further details regarding agricultural labour in the different districts of England and Wales —

Northumberland Durham Cumberland and Westmorland.—Labour is still scarce in this neighbourhood but with the help of soldiers and women the shortage has been minimised. The excellent weather has greatly helped the farmers as the hay required very little working with a resultant saving in casual labour.

Lancashire and Cheshire. Labour is generally deficient, but the favourable weather for the hay harvest has counteracted the shortage, and with temporary assistance the work has been met.

Yorkshire.—The supply of labour is still short but women and soldiers are greatly helping farmers whilst the good hay making weather rendered less labour necessary in the hay fields.

Shropshire and Stafford. Labour is still scarce but great assistance has been received from soldiers and women.

Derby Nottingham Leicester and Rutland.—Labour is still deficient, but with the assistance received from soldiers and women the farmers are getting along fairly well.

Lincoln and Norfolk.—Labour is still short notwithstanding the assistance given by women and soldiers. Good hay-making weather mitigated this shortage to a certain extent.

Suffolk Cambridge and Huntingdon.—Labour is still very deficient, but the assistance given by women and soldiers has helped to relieve the situation in many places.

Bedford Northampton and Warwick.—Labour still remains scarce although wages are high. Women and soldiers have been helping in most districts. The good hay making weather caused a great saving in casual labour.

Buckingham, Oxford and Berkshire.—Labour is generally deficient and little hoeing has been done but women and soldiers have greatly assisted during the hay harvest.

Worcester, Hereford, and Gloucester—The supply of labour is short, but assistance in the hay harvest has been given by soldiers, and women and boys have also proved useful

Cornwall Devon, and Somerset—Labour is everywhere short, but assistance has been given by soldiers and women

Dorset Wiltshire and Hampshire—Labour is generally short but with the assistance of soldiers women and boys farmers have managed to meet the urgent work

Surrey Kent, and Sussex—The supply of labour is generally short, but farmers have been able to cope with the urgent work with the assistance of soldiers and women

Essex, Hertford and Middlesex—The supply of labour has been short but with the assistance of soldiers and women the farmers have been able to get through the work

North Wales—Labour is still deficient, but owing to the men working overtime and with assistance received from soldiers, women and children, the work is well in hand

Mid Wales—Labour is scarce especially casual workers, but good hay making weather helped farmers over this difficulty

South Wales—Labour is still deficient though soldiers and women have been employed

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Prevalence of Animal Diseases on the Continent

THE following statement shows that according to the information in the possession of the Board on 1st August 1917, certain diseases of animals existed in the countries specified —

Austria (on the 30th May)—Foot-and-Mouth Disease Glanders and Farcy Sheep pox, Swine Erysipelas, Swine Fever

Denmark (month of May)—Anthrax, Foot-and Mouth Disease Swine Erysipelas Swine Fever

France (for the period 17th June—7th July)—Anthrax, Blackleg, Foot-and-Mouth Disease Glanders and Farcy, Rabies, Sheep-scab, Swine Erysipelas, Swine Fever

Germany (for the period 15th—31st May)—Foot-and-Mouth Disease, Glanders and Farcy, Pleuro pneumonia, Swine Fever

Holland (month of June)—Anthrax, Foot-and-Mouth Disease, Foot rot, Glanders, Swine Erysipelas

Hungary (on the 30th May)—Foot-and-Mouth Disease, Glanders and Farcy Sheep pox, Swine Erysipelas, Swine Fever

Italy (for the period 2nd—8th July)—Anthrax, Black leg, Foot-and Mouth Disease (497 outbreaks), Glanders and Farcy, Rabies, Sheep scab, Swine Fever

Norway (month of June)—Anthrax, Black-leg

Russia (month of November)—Anthrax, Cattle plague, Foot and-Mouth Disease (29 862 animals) Glanders and Farcy, Pleuro-pneumonia, Rabies Sheep pox, Swine fever, Swine Erysipelas

Spain (month of April)—Anthrax, Black-leg, Dourine, Glanders and Farcy, Pleuro pneumonia, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Tuberculosis

Sweden (month of June)—Anthrax, Black-leg, Swine Fever.

Switzerland (for the period 9th—15th July)—Anthrax, Black-leg, Swine Fever

No further returns have been received in respect of the following countries Belgium, Bulgaria, Montenegro, Rumania, Serbia.

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	JULY.		SEVEN MONTHS ENDED JULY.	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	18	27	311	345
Animals attacked	21	30	357	406
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	1
Animals attacked .	—	-	—	24
Glanders (including Farcy):				
Outbreaks...	2	5	16	32
Animals attacked ..	2	13	28	84
Parasitic Mange:—				
Outbreaks	144	114	1 734	1,590
Animals attacked	225	189	3,412	3,641
Sheep-Scab:—				
Outbreaks	8	1	391	178
Swine Fever:—				
Outbreaks	163	355	1,575	2,970
Swine slaughtered as diseased or exposed to infection	71	300	680	8,385

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	JULY.		SEVEN MONTHS ENDED JULY.	
	1917	1916.	1917.	1916.
Anthrax:—				
Outbreaks	—	1	3	3
Animals attacked	—	1	5	7
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	—
Parasitic Mange:—				
Outbreaks	4	6	32	43
Sheep-Scab:—				
Outbreaks	6	22	239	248
Swine Fever:—				
Outbreaks	15	35	156	194
Swine slaughtered as diseased or exposed to infection	50	231	980	1,115

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in July, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb	per 12 lb	per 12 lb.	per 12 lb	per 12 lb	per 12 lb.
British	—	—	—	—	22 6	21 6
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt
Irish Creamery —Fresh	200 0	196 0	204 0	200 6	200 6	196 6
,, Factory	181 0	175 6	182 6	178 6	183 6	178 0
Danish...	—	—	215 6	212 6	213 6	210 0
French...	—	—	—	—	205 6	196 6
Dutch	—	—	—	—	192 0	182 6
Australian	194 6	190 0	—	—	195 0	191 0
New Zealand	200 0	197 6	—	—	201 0	197 0
Argentine	—	—	—	—	193 6	190 0
CHEESE :—						
British—						
Cheddar	140 0	—	—	—	139 0	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	147 6	143 0	146 0	—
			per cwt.	per cwt	per cwt	per cwt
Canadian	130 6	--	130 6	—	130 6	—
BACON :—						
Irish (Green)	149 6	147 6	153 0	148 6	148 6	145 0
Canadian (Green sides)	128 6	126 0	133 6	127 0	133 6	130 6
HAMS :—						
York (Dried or Smoked)	—	—	—	—	185 0	177 6
Irish (Dried or Smoked)	—	—	—	—	155 6	150 6
American (Green) (long cut)	128 6	126 6	129 6	126 6	130 0	126 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120	per 120
British	—	—	—	—	25 5	23 9
Irish	24 0	—	23 9	22 7	24 4	23 3
Danish	—	—	—	—	25 4	23 1
POTATOES :—	per ton	per ton.	per ton	per ton.	per ton.	per ton.
Duke of York... ...	305 0	235 0	—	—	306 6	280 0
Irish	261 6	226 6	340 0	270 0	—	—
Other First Earlies ...	301 6	215 0	341 6	270 0	270 0	246 6
HAY :—						
Clover	—	—	150 0	140 0	138 0	128 6
Meadow	—	—	—	—	137 6	128 6

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1915, 1916 and 1917.

Weeks ended (in 1917).	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916		1917.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 6...	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
,, 13...	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
,, 20...	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
,, 27...	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb. 3...	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
,, 10...	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
,, 17 ..	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
,, 24...	56	0	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar. 3...	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
,, 10...	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
,, 17...	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
,, 24...	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
,, 31...	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl. 7...	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
,, 14...	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
,, 21...	56	5	55	3	84	10	31	5	52	10	70	6	30	11	31	8	59	8
,, 28...	58	3	56	3	81	1	32	7	53	5	69	5	31	5	32	4	58	6
May 5 ..	60	5	55	7	77	7	33	3	53	1	64	4	32	4	32	10	54	9
,, 12...	61	7	55	5	78	0	34	0	53	5	64	11	32	5	33	1	55	2
,, 19...	62	0	55	0	77	11	34	1	52	10	64	10	32	8	33	0	55	2
,, 26...	61	11	54	7	78	0	34	8	52	9	64	9	32	7	33	4	54	11
June 2...	61	9	53	3	78	0	35	4	53	9	65	11	32	5	33	3	54	11
,, 9...	60	1	51	2	78	0	34	5	52	8	67	7	32	4	32	7	55	0
,, 16...	56	1	48	10	78	2	34	3	50	9	75	6	31	9	32	1	55	1
,, 23...	52	0	47	6	78	1	34	4	49	10	75	0	31	9	31	3	55	2
,, 30..	49	5	46	3	78	3	35	3	49	1	73	11	31	1	30	10	55	1
July 7...	50	1	46	3	78	1	34	7	45	6	69	5	31	6	30	8	55	2
,, 14...	52	7	48	11	78	2	35	8	47	5	70	10	31	6	31	6	55	1
,, 21 .	53	10	51	6	78	3	35	10	48	8	72	1	32	1	32	3	55	2
,, 28 ..	55	3	53	5	78	3	36	1	47	2	65	7	31	1	32	5	55	2
Aug 4...	55	4	55	1	78	2	35	7	46	1	73	6	31	5	32	9	55	0
,, 11...	55	2	56	7	78	4	37	0	46	11	76	1	31	7	31	2	55	0
,, 18 ..	54	3	58	1			39	4	48	0			31	4	30	8		
,, 25...	51	11	59	0			38	3	47	1			30	0	31	6		
Sept 1...	45	3	59	4			38	1	48	5			26	10	30	5		
,, 8..	43	0	59	3			37	11	51	7			26	8	31	1		
,, 15...	42	9	59	11			39	0	52	6			26	4	30	9		
,, 22...	43	3	59	4			39	8	53	3			26	1	30	9		
,, 29...	43	5	58	10			40	4	54	1			26	5	31	1		
Oct 6...	44	1	59	2			41	0	54	5			26	5	30	9		
,, 13...	45	9	59	7			42	3	53	10			27	1	31	6		
,, 20...	48	2	60	9			44	0	53	8			28	1	31	11		
,, 27...	50	3	62	10			46	2	54	6			29	1	32	10		
Nov. 3...	51	6	66	7			47	3	56	2			30	4	34	0		
,, 10...	52	8	69	8			47	5	58	0			30	11	35	8		
,, 17...	53	6	70	9			47	11	59	8			31	3	37	8		
,, 24...	54	2	70	8			48	7	61	8			31	1	39	7		
Dec. 1...	53	7	71	3			48	11	63	1			30	11	41	4		
,, 8...	52	10	72	1			47	10	65	6			30	4	44	1		
,, 15...	53	11	73	2			47	5	66	5			30	6	45	10		
,, 22...	53	10	74	8			47	2	67	3			30	7	46	5		
,, 29...	54	9	75	10			47	5	67	5			30	10	47	4		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb; Oats, 39 lb. per Imperial Bushel.

AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of July, 1915, 1916. and 1917.

—	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d	s.	d.
London ...	54	10	50	11	79	7	36	3	48	6	65	7	32	11	33	4	54	9
Norwich ...	51	1	50	0	77	11	36	3	—		67	2	32	6	32	1	55	0
Peterborough	52	10	49	11	78	8	34	9	44	6	65	1	31	9	31	11	54	11
Lincoln ...	51	4	52	5	78	1	33	0	46	10	65	7	31	9	32	1	56	0
Doncaster ...	50	8	48	9	77	11	34	3	—		65	4	30	11	31	7	55	0
Salisbury ...	50	11	50	10	78	5	35	5	49	1	74	4	31	2	31	0	54	11

The Weather in England during July.

District.	Temperature		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours	Hours.
Week ending 7th July:								
England, N.E. .	53·9	—4·3	0·01	0	—13	1	8·0	+1·5
England, E. . .	57·0	—2·8	0·04	1	—10	1	9·3	+2·3
Midland Counties ...	56·6	—2·8	0·08	2	— 9	1	8·3	+1·8
England, S.E. ...	58·6	—1·8	0·92	24	+13	3	8·3	+0·9
England, N.W. .	57·7	—0·5	0·00	0	—13	0	10·7	+4·3
England, S.W. ...	57·3	—1·8	0·50	13	0	3	7·3	+0·2
English Channel ...	58·6	—1·6	0·22	6	— 6	3	5·1	—3·2
Week ending 14th July:								
England, N.E. ...	57·7	—1·0	0·05	1	—15	1	6·6	+0·4
England, E.	59·7	—0·7	1·02	26	+13	3	7·6	+0·8
Midland Counties .	59·3	—0·3	0·28	7	— 6	1	6·5	+0·6
England, S.E. ...	60·0	—1·2	0·49	12	+ 1	2	7·0	—0·2
England, N.W. ..	59·1	+0·5	0·02	1	—16	1	8·1	+1·8
England, S.W. ...	59·1	—0·3	0·41	10	— 6	2	8·1	+1·6
English Channel ...	60·9	0·0	0·26	7	— 5	2	8·8	+0·9
Week ending 21st July:								
England, N.E. .	60·4	+1·6	0·46	11	— 4	4	6·7	+1·1
England, E.	62·4	+1·4	0·54	14	— 1	4	7·6	+0·9
Midland Counties ..	61·5	+1·2	0·87	22	+10	4	6·6	+1·0
England, S.E. .	62·2	+0·7	0·66	17	+ 4	3	7·5	+0·7
England, N.W. ..	60·2	+1·2	0·86	22	+ 5	4	7·5	+1·9
England, S.W. ...	60·2	+0·1	0·89	23	+ 5	3	5·6	—0·5
English Channel ...	62·0	+0·7	0·65	16	+ 3	3	6·5	—0·8
Week ending 28th July:								
England, N.E. ...	64·9	+6·4	0·41	10	— 8	3	6·5	+1·4
England, E.	66·0	+5·5	0·03	1	—14	1	8·2	+2·4
Midland Counties ...	65·1	+5·4	0·27	7	—12	2	5·9	+0·7
England, S.E. ...	64·0	+2·7	0·14	4	—11	2	7·4	+1·0
England, N.W. . .	63·3	+4·5	0·62	16	— 6	4	5·4	+0·2
England, S.W. ...	62·6	+2·7	0·40	10	—11	3	4·2	—1·5
English Channel ...	64·4	+3·0	0·17	5	—10	2	7·3	+0·4

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THE BREAKING UP OF GRASS LAND.[*]

THE accumulated experience of British farmers is expressed in the agricultural proverb, "To break a pasture will make a man," but the public comments which have been made on the question since the Department's programme of tillage for 1918 was announced, suggest either that the experiences of our forefathers have been forgotten or that the other part of the proverb, "To make a pasture will break a man," has sapped the courage of those agriculturists who have recently endeavoured to prove that the breaking up of grass land is the food producer's short road to ruin, and that the only prudent plan is to increase production on existing arable land. That the existing arable land may be made to yield more food is admitted, and that in many cases it will yield more is expected; but in view of the urgent necessity of adding to the food supply of the country, a policy which neglected the fertility stored up in our grass lands would clearly be indefensible. We cannot rely on the chance that a favourable season and concentration of available resources on existing tillage land may enable the farmer to produce more food in 1918 than, with all the resources of peace, he produced before the War. Again, although it is admitted that modifications in the rotation will enable much more corn to be produced on existing arable land than formerly, we cannot assume that the War will end in 1918; or that our land can retain its condition if we largely reduce the area under clover; or that we can maintain a full milk supply, support through the winter months our valuable flocks and herds, prepare the manure on which successful tillage depends, and keep our soils free from weeds, if we largely reduce the area under roots.

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[*] This article forms the first few pages of a "Report on the Breaking Up of Grass Land," by Mr. T. H. Middleton, C.B., Deputy-Director-General, Food Production Department of the Board. The Report is based on inquiries addressed to farmers in all parts of the country by the Cultivations Sub-Committee of the Technical Committee of this Department. Copies of the Report, which contains also very complete summaries of 142 reports on the breaking up of grass land in the different counties of England and Wales in 1916–17, may be obtained free of charge and post free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1. Letters or post-cards of application need not be stamped.—*Ed.*

More arable land is necessary, and, therefore, grass land must be broken up. This policy has been approved, and the question of immediate importance is not whether grass land shall be ploughed, but how the grass which must be broken up should be dealt with.

Much useful experience has been gained by farmers who have broken up grass land during the past winter and spring, and, with the object of advising those who have the task in front of them, the Department addressed inquiries to a large number of farmers in different parts of the country.

Up to the time of writing over 300 replies have been received from 55 counties In view of the difficulties attending the work last spring, the inexperience of many of the farmers in breaking up old grass, and the unskilled labour that had often to be employed, the results secured have been very satisfactory. For every failure reported there have been four successes, and, though some of the failures cannot be accounted for, most of them are due to reasons which further experience should enable farmers to avoid.

Successes are reported in growing many kinds of crops on the newly broken grass. Oats, wheat, barley, peas, beans, potatoes, mangolds, mustard, rape, turnips, linseed, are all mentioned as having given satisfaction, and it is evident that a farmer who knows his work has a considerable choice of crops available. As little of the land reported upon had been taken in hand until after the New Year, and most of it was broken up between the middle of February and the end of April, few of the reports relate to autumn-sown crops, and in by far the larger proportion of cases spring oats was the crop grown. Black Tartarian oats have been grown frequently and white Tartarian oats have also been popular in the south. In the other cases, ordinary white oats have been grown, the varieties differing with the district.

LESSONS FROM THE SUCCESSES AND FAILURES OF 1917.

As stated in the opening paragraph, it has been argued during the past few months that it is hopeless to attempt to plough out old grass land in the expectation of adding to the nation's food. The experience of 1917 does not support this contention. It shows not only that the successes far outnumber the failures, but that the latter are to some extent preventable Failures occurred chiefly in the south and east. They are comparatively rare elsewhere. In by far the greater number of cases they have been attributed to wireworms.

The wireworm is bad enough, but is not as vile as his reputation. Much of the damage put down to wireworms was primarily due to the drying out of the newly ploughed soil through lack of proper tillage ; and in the south much damage which the wireworm was supposed to do was. in reality, caused by the frit fly. Many remedies for these insect pests have been suggested. The most satisfactory are those which depend on suitable tillage. Frit flies are most troublesome in the case of crops sown in mid-season. Oats sown before 15th March and after 15th April may escape when crops sown between these dates may be destroyed. Wireworms are most destructive in loose, open soils, partly because they can get about easily, and partly because crops, if injured. die quickly in a hollow, dry soil ; while in a firm soil, even should part of the root system be cut by a wireworm, the plant soon re-establishes itself.

The Time to Plough.—Under present conditions it is not usually possible for the farmer to choose his time ; he must plough whenever the weather is suitable, and although ploughing out of season may necessitate modifications in the usual tillage, good results may be expected to follow suitable handling.

There are two cases in which emphasis has been laid on ploughing at the right time.

(*a*) The first is the case of poor, heavy clay land in the drier parts of the country. Soils of this type are dense, sour and lack air. If exposed to the hot summer sun and to summer rain they crumble and form a healthy seed-bed. Land of this type should be broken in summer so that there may be at least a partial fallow. When such land is ploughed up out of season it is likely to require specially careful management.

(*b*) The second case in which timely ploughing is insisted on is that of the medium or light land of those districts most subject to wireworm attacks. It has been the experience of a number of farmers that the oat crop on late-ploughed and late-sown land has been better than on grass broken up earlier in the season. If there were a choice, it is unquestionable that there would be less trouble from wireworm on land ploughed in March than December in certain parts of the southern counties. On the other hand, crops sown in the second half of March are more subject to the attacks of frit fly than those sown earlier, and, given intelligent management, it would appear that the early-sown crop on land ploughed in autumn and winter may often be as safe as the late-sown.

As success so frequently depends on burying the turf properly, disc and skim coulters attached to the plough are most useful in breaking up grass.

Cultivation after Ploughing.—In many cases, especially in those of the medium and light soils in the north and west, the subsequent cultivation of grass land ploughed up with the ordinary ley furrow is a simple matter. If ploughed early in the season, so that the well-packed furrow slice has time to consolidate further and to weather down under frost and rain, the broadcast sower and harrow will do all that is required until in the late spring the roller prepares the surface for the harvester. But the old sod, the tractor plough, and late spring ploughing, with the object of defeating wireworm, have between them brought four implements, the disc cultivator, the disc drill, the land presser and the Cambridge roller* into much greater prominence than before.

Disc harrows or disc cultivators are frequently mentioned as valuable aids by those who have succeeded in growing good crops after grass; with their help the flat furrow left by the tractor plough has been converted into a good seed-bed, better indeed, to the surprise of some northern farmers, than that obtained from the orthodox grass furrow of the horse plough. When the furrow slice is imperfectly turned the disc harrow breaks the uneven land down, and when the furrow is turned over on its face, this harrow secures a tilth on the surface without disturbing the buried sod; an important point, as will appear from what follows.

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* This old implement, now always called the Cambridge roller, was originally known as Cambridge's *Patent Press-wheel Roller*, and was designed to combine the work of the land presser and the ordinary roller.

In the case of all land ploughed out of grass in autumn, winter and spring, the efforts of the farmer must be concentrated on getting it sufficiently solid before seeding, and the thicker the turf and later the ploughing the more necessary the presser and roller become. The usefulness of the roller in checking wireworm has already been remarked on; but there is a greater enemy to the young corn crop of the south and east than wireworm, namely, drought. From the middle of April onwards the soil dries rapidly, and, if it is at all loose and contains large quantities of half-decayed turf, even a week's dry weather and hot sun in May will check the crop. On the other hand, if the turf has been well rotted, and if the soil has been compacted so that there is no break in passing into the subsoil, the young corn plant should stand dry weather quite as well on ploughed grass as on old arable land. Some farmers, who broke up land last spring and failed, have seen the reasons for failure so plainly that they are going to break more next winter and put sheep as well as rollers on the land to make it solid.

In land left hard on the surface from frequent treading, or on land where there is a tough sod, the disc drill covers the seed much more effectively than the ordinary drill, and does not tear up the sod as an ordinary coulter drill is apt to do.

Manures.—Many farmers attribute success to the use of suitable manures. It is seldom that pasture land of fair quality should require manure in order to produce a good corn crop, and as a general rule the existing supplies of manure should be conserved for our old arable land, much of which badly needs manuring.

There are, however, exceptions to the statement that grain crops on ploughed grass do not want manure. Many clay soils in the south and east were almost absolutely exhausted of available phosphates before they "tumbled down" to grass a generation ago, and the condition of the existing vegetation shows that until phosphates are supplied little wheat can be expected. In such cases a dressing of 2 to 3 cwt. per acre of superphosphate or of basic slag at sowing time should be given. Backward wheat may be assisted in the autumn or early spring by sulphate of ammonia (¾ to 1 cwt. per acre); but it is usually too late to revive wheat which is seen to be "going off" in May. Where there is a poor, matted turf, mixed manure supplying ¾ cwt. sulphate of ammonia and 2 cwt. superphosphate is very necessary for the oat crop. On poor pastures a dressing of sulphate of ammonia before sowing oats seems to have been markedly effective in several of the instances in which wireworm threatened the crops, but the experience of the majority of those who used it is probably summed up by the Monmouthshire farmer whose comment was: "What absolute fools the Authorities were for recommending sulphate of ammonia for corn on new land."

THE TREATMENT OF LAND OF DIFFERENT TYPES.

With the object of giving precision to the recommendations in the reports, it will now be desirable to indicate the kind of tillage called for by different types of land. As soils grade almost imperceptibly from one type to another, so the methods of management vary; but for each well-marked type of soil there are certain approved methods.

(i.) **Medium and Light Soils.**

Second-rate Pastures.—There is a very large area of land of this description in England and Wales. Some of it may be very old grass, with a thick, matted turf, but the greater part consists of grass land from 5 to 10 years old in the long leys of Wales and the west of England; or of pastures from 15 to 30 years old which have been allowed to lie in grass because of the low prices of corn, such as those on the chalk in Wiltshire

Where there is a thick-matted turf, early ploughing should be resorted to, otherwise there will not be time for the sod to crumble before the first crop is sown, and this is likely to be a failure. When this coarse-matted surface layer is met with on light soils, the land should be ploughed with a flat furrow; the disc cultivator will prove useful, and a dressing of lime (1 to 2 tons per acre) will greatly aid decay. If the soil is sandy lime should be used sparingly, and ground limestone is preferable to burnt lime. The lime should be applied either several months before ploughing, or as soon as the furrow has been turned. When the turf is thin, as it usually is in the case of long leys and chalk pastures, the time and type of ploughing will depend on local conditions. The experience of Wiltshire and Hampshire favours spring ploughing; but in many other cases, especially where the soil is raw and deficient in lime, exposure to frost is most desirable, and an effort should be made to turn the furrow before the end of January. Where the farmer owns a drill a flat furrow will probably be best, as the land is then more easily consolidated; but if, as is usual in hilly districts, the oats are to be sown broadcast, then the plough should be set to turn the ordinary ley furrow from 5 to 6 in. deep and 8 to 9 in. wide. This furrow must be thoroughly well consolidated; the later the ploughing, the thicker the turf, and the drier the district, the more necessary the use of the roller becomes. The harrow must, of course, be used as often as may be necessary, and if harrowing begins before the ploughed land has settled down, short tines or a spiked chain harrow will be desirable, in the first instance, so as to avoid bringing up the turf When ploughing is delayed until after the end of January a flat furrow is likely to prove best. even when the crop is sown broadcast.

Good Grass on Medium or Light Land.—An inch or two of additional depth may altogether alter the character of the grass, and soils of the type discussed above may gradually shade from medium to good, or even rich, grass land within the same enclosure. Thus, in ploughing up a 20-acre field, it may frequently happen that 5 or 6 acres at the lower or more sheltered side may (partly from the natural quality of the soil, and partly because stock have favoured it) consist of very fine land in such high condition that an oat crop would lodge. This type of soil should be planted with potatoes. No farmyard manure will be necessary. A dressing of 3 to 4 cwt. superphosphate, 1 cwt. to 1½ cwt. sulphate of ammonia and some potash manure. such as flue dust, supplying the equivalent of 2-3 cwt. kainit, will suffice. If no potash is available and the soil is light, a small dressing of farmyard manure is desirable. If the sod is very thick it must be thoroughly broken, otherwise there will be difficulty in moulding up the potato crop. To break the turf, disc harrow the surface thoroughly, then plough deeply, using a skim coulter to bury the vegetation. If no disc harrow is available, plough shallow early in winter, break up the sod with a drag harrow and plough under with a deep furrow. In the case of land which is medium in texture and inclined to be damp, it is neither necessary nor desirable to secure a fine tilth for potatoes; the sod helps to keep the soil light and open, and if the turf is not thick, ordinary deep ploughing, cultivating and harrowing will bring the field into a suitable condition for ridging up.

Good Grass on Deep, Rich Alluvial Soil.—Land of the type last considered may shade into a rich, deep loam; or, as in Lincolnshire, there may be fine silt or warp land now used for fattening cattle, but known to be so well adapted for arable farming, that under present circumstances it should be broken up. In the coming autumn it will be necessary to sow wheat on a large part of the stubble land which, in ordinary circumstances, would be planted with potatoes, and to replace the area lost it will be necessary to grow potatoes on this rich grass land, which experience has proved to be so well suited to the crop. Deep alluvial land may best be prepared for growing potatoes by ploughing to a depth of from 10 to 12 in. This depth is secured by employing two ploughs following each other in the same furrow. One takes off the surface to a depth of 2 in. or 4 in., turning the turf into the bottom of the deep furrow left by the other plough, which opens a furrow of from 6 to 8 in. The thick turf of this rich land is thus buried at a depth at which it will rot and will not dry out the soil, and, in contrast with the medium land last referred to, the potatoes are grown in the rich loam which underlies the turf, not in a mixture of turf and loam.

(ii.) **Heavy Loams and Clay Soils.**

Second-rate Grass.—Much inferior grass land on heavy loams and clay soils exists in the Midlands and South of England. Heavy loams and clays may be managed in the way recommended for medium loams. They want earlier ploughing, because more exposure to the weather is necessary, and, if late ploughed, more cross-cultivating, ploughing or harrowing and rolling will be wanted than in the case of lighter soil; if thin in the turf they may benefit by cross ploughing in spring.

As regards the heavier classes of clay soil in the warmer parts of the country, there is general agreement that they should have a summer fallow, or at any rate a bastard fallow, before an attempt is made to grow wheat. At the latest the work should be taken in hand immediately after the hay harvest. Steam tackle is of special value. The surface should be torn up by the cultivator and exposed to the sun so as to dry out and kill the turf and mellow the surface layer of clay. The turf on land of this description is usually full of weeds, especially of bent (*Agrostis*), which unless killed would prove very troublesome in arable land; it is, therefore, necessary to dry the turf on the surface, whereas when soils are deep and the turf is thick and of good quality, the tillage must aim at burying and rotting the surface herbage. The actual management of these clay pastures must vary with the season. When broken up before mid-summer the land can scarcely be too rough, the sun and rain will mellow the clods, and there will be time to work them into a wheat seed-bed before the autumn. Later in the season, till mid-August, a moderately moist soil, a flat, shallow furrow, cross ploughing and subsequent cleaning by the use of the cultivator and harrow are necessary. There would not be enough sun to bake large lumps properly, and autumn might find the land full of bent. When there is a choice the best results follow the early use of steam tackle, for as there is no tilling implement that can equal frost on a strong loam, there is none that can search out and mellow a raw clay soil so well as the summer sun.

To make a success of wheat on a clay soil broken up from grass, a bastard fallow is almost an essential preliminary in the south-east.

When grass has been broken up after harvest, winter oats or beans may be sown, but, as a rule, sowing should be deferred until spring.

When heavy loams or clay soils covered by inferior herbage cannot be tackled in summer, and must of necessity be broken up in autumn and winter, the best plan will probably be to plough as deep as possible, invert the furrow slice, and endeavour to rot the surface weeds before spring tillage begins.

Spring oats on newly-broken clays may do fairly well in the Midlands or the North, but, as a rule, are unsatisfactory in the South. Peas would appear to be the best crop for March sowing on this class of land, if beans cannot be sown in February.

Poor, clay soils are usually very deficient in phosphates and should get 2 to 4 cwt. per acre of basic slag before the seed is sown. In dry districts and for spring crops 2 to 3 cwt. of superphosphate may be substituted. From ½ to 1¼ cwt. per acre of sulphate of ammonia may often be usefully applied to cereals on land of this description.

Good Grass on Heavy, Clay Soil.—Good grass on stiff land has a special value; not only are the feeding properties high, but it withstands dry weather when other pastures become bare. Although, when labour is abundant and the land is well drained and well managed, it may grow fine crops of wheat and beans, good pastures on clay land should not be broken up under existing conditions.

(iii.) **Derelict Land.**

Very Poor Grass on Stiff, Clay Soil.—As a rule this should not be broken up at present: the labour available can be put to better uses. Very poor grass is usually found on cold, wet soils very deficient in phosphates, and not only expensive tillage but liberal manuring would be needed. Even then the success of corn crops would be very uncertain. Land of this description should never be broken up until the surface has been enriched by the growing of white clover and other leguminous plants which cover such soils after they have been dressed with basic slag.

Very Light, Sandy Soils and Heaths.—These are easy to till, but, as a rule, they should not be broken up while labour is scarce, except in the neighbourhood of camps where there is an abundance of manure. Such soils, besides being readily injured by dry weather, usually want large quantities of artificial manures and lime. Potash manures, which are specially necessary, are at present so scarce that they should be reserved for land of better quality.

An attempt has been made in the foregoing pages to indicate how grass land should be broken up (examples from all parts of the country are quoted in the Appendix to the Report). The essence of the experience of 1917 is contained in a Yorkshireman's maxim, "Tread the turf well or else you will have trouble"; but everyone who has had long experience of tillage land knows how variable are the problems presented by the ploughed field, and how impossible it is to give directions for the successful management of all types of soil which the British farmer ploughs, in all the "samples" of weather with which the British climate can be credited. Grass land must be broken up, and to this task the farmer is expected to give all his skill and knowledge in the coming year. He must not, as in the case of the Welsh critic, wait until the corn is laid before he comes to the conclusion "what absolute fools the Authorities are"; he must be guided by his experience, and then, like a Cumbrian farmer who, though vexed by the agents of the Government, ultimately triumphed by the exercise of "practical common sense," he will, it may be predicted, in four cases out of five, grow a satisfactory crop in 1918; since, fortunately for the country, "practical common sense" is not monopolised by the farmers of Cumberland.

THE NATIONAL FOOD SUPPLY IN PEACE AND WAR.[*]

THE statistics published by the Food Committee of the Royal Society upon the National Food Supply[†] afford the material for a consideration of the best means of utilising the available supplies of food in the present emergency.

For an estimate based on the relative value of foodstuffs it is convenient to take a unit which is common to all food. While due allowance may be made for the value of the class of substance known as vitamines in the promotion of growth, and as a preventive against diseases, such as scurvy or beri-beri, the main value of food is its service as fuel for the machinery of the human body, and just as the work-producing power of coal, oil, or petrol is measured in calories or units of heat, so the value of food may be measured in calories or the power which a human being derives for doing his work from the oxidation of his food.

The tables of the Food Committee show that in the five years before the War the nation was consuming food representing the huge total of 51 million millions of calories. Allowing for the smaller amount consumed by women, children, etc., this would show an average of some 4,000 calories for each average man per diem, or 15 per cent. in excess of the 3,400 calories which is the generally accepted standard of diet for an average man doing an average day's work. This diet was made up in the following proportions: 26 per cent. bread, 4 per cent. for flour used in cooking, 4 per cent. for other cereals, meat 18 per cent, dairy produce 15 per cent., sugar 13 per cent., potatoes 10 per cent., and all other foods 10 per cent. Thus, during the five years before the War, cereals contributed over one-third of the total work-producing power of the nation. The reason for this is obvious. In no other food which can be bought in sufficient quantities can so much work-producing power be obtained at so little cost. At pre-war prices a penny bought nearly 900 calories, and even at 3*d*. a pound it provides 400 calories. Where more money is available for household expenses, meat to a great extent takes the place of bread, and families which can afford to buy meat consume less bread in proportion. But in times of stress and dearness, the tendency is to fall back more and more upon the cheaper food.

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[*] This article is in the main a summary of a pamphlet with the same title by Prof. T. B. Wood, of Cambridge, published by the Cambridge University Press. Price 6*d*.

[†] *The Food Supply of the United Kingdom* [Cd. 8421], published by H.M. Stationery Office, Kingsway, W.C. Price 4*d*.

These considerations go to show the immense importance of securing an adequate supply of breadstuffs in the national interest. A war food policy should undoubtedly include a campaign against waste, but it is clear from the figures given above that even the most rigid economy would not effect any considerable saving. The total amount of waste in all foods in a time of plenty only amounted to 15 per cent., of which the bulk was animal fat. On the other hand, any reduction of the consumption of food below the limit of 3,400 calories which are required by the average man can only be achieved by a sacrifice of national efficiency. The principal aim of a sound war food policy should therefore be to secure an extension of the supply of breadstuffs. This may be done both by importing more wheat and by growing more at home. But neither of these solutions is easily attained in time of war. The shortage of the world's harvests and of available shipping make importation increasingly difficult, while the conversion of pasture into arable land at home is a matter that requires time before any considerable result can be achieved. There is, however, another method which appears to offer a satisfactory solution to the problem, and one that can be put into practice with every prospect of securing the desired results at an early date. Some 17 000,000 tons of cereals were consumed annually in these islands in the years 1909-1913, of which about 6½ millions were grown in the country and about 10½ imported. Of this great total only just over 5¼ million tons were used as human food, ½ million tons were reserved for seed. 1¾ millions went to brewing and distilling, 300,000 tons to other industries, and over 9 million tons were used for fodder. Thus by far the greatest part of the grain available before the War was consumed by animals, and of the entire total less than one-third was used for human food—actually less, indeed, than the amount produced in our own cornfields. Clearly then, if it is possible to distribute the available supplies of grain in a different manner, a very much larger proportion of the supply might be made available for the food of the people. If the various claims upon the country's supplies of grain are considered separately, it will be seen that it is not possible to reduce the amount required for seed—indeed, that is likely to be largely increased because of the measures taken to bring a large quantity of fresh land under the plough. On the other hand, the amount of grain for brewing has been reduced to about one-third of the pre-war figure, and the use of grain for making starch and for other industrial purposes has also been restricted.

There remains the largest item of all, that for fodder. The question therefore arises, is it possible to divert any portion of this food from animals to men? And this involves the subsidiary questions as to whether such a diversion would be economical from the general point of view, and whether it would not involve a dangerous depletion of the live stock of the country? The Royal Society Committee's Report shows that the live stock of the country, including not only the larger animals but poultry, game, rabbits, etc., provide about 6½ million tons of animal food containing about 1½ million tons of dry human food. But the live stock, including horses, consume 71 million tons of dry fodder, and allowing 11 million tons as the share of the horses it follows that the rest of the live stock consume 60 million tons of dry fodder and produce 1½ million tons of dry human food, or 40 tons of dry fodder for every ton of dry human food. If these figures are not sufficiently startling, it must further be remembered that these 60 million tons include grain and potatoes, equivalent to 6½ million tons of dry food, if eaten by human beings directly, but which, when converted into meat, would not be likely to yield more than ½ million tons of dry human food. It is not necessary to enlarge upon the wastefulness of this method of using cereals, and a detailed consideration of the facts will serve to show that a large proportion of the material can be usefully diverted from the feeding of animals to the nourishment of human beings.

Of the maize imported before the War, the bulk, or about 1½ million tons, was fed to pigs, and in this way produced not more than 150,000 tons of dry human food. Oats were chiefly fed to horses, but if the supply was restricted to working horses only and denied to those used for pleasure, ½ million tons would become available for human consumption. From barley and other grains, and from the closer milling of wheat, another 1½ million tons might be obtained, making 3½ million tons in all containing 3 million tons of human food, which, if fed to pigs (the most economical converter of grain into flesh), would only produce about 250,000 tons of dry human food. By these means and by the restrictions made in the amount of barley for brewing, and in the use of cereals for industrial purposes, the redistribution of the supplies of grain, other than wheat, would be somewhat as follows: Of a grand total of 8¼ million tons, of which over 2¾ millions would be imported, about 3¼ million tons would be available for human consumption, rather less than 3¾ million tons would go as fodder, and the remainder would serve for seed, brewing and other industries. These 3¼ million tons thus set free for human food will provide some 2¼ million tons of flour. Any supplies which the nation requires beyond that amount must consist of *wheat*. It was shown at the outset that in peace time the nation consumed food to the value of 4,000 calories per day for each average man of the population, the number being estimated at 35 millions. In time of war, with a large number of men in the army and a very much larger number of men and women than in normal times engaged in active pursuits, involving a greater expenditure of energy, the amount of fuel required as food is increased proportionately. Owing to these considerations the estimate for population, in terms of man-power, should be increased by a million. Each of these units, in peace time, consumed per day 4,000 calories of food, of which 34 per cent. consisted of cereals. The work-producing power of 1 lb. of flour is 1,650 calories, and accordingly we shall be on the safe side if we allow 1 lb. of flour per average man per day. On this basis the national demand for cereals for the whole year will amount to 6 million tons, and allowing for the possibility of decreased digestibility of the food due to the new milling regulations and other contingencies, it will be safe to put this down at 6½ million tons. Deducting the 2¼ million tons of flour obtained by rescuing the other cereals from cattle fodder and reckoning home-grown wheat as another million tons, supplying ¾ million tons of flour, there remains a balance of 3½ million tons of flour to be supplied by importation, and 4¼ million tons of wheat would give this amount of flour together with nearly a million tons of offal. The amount of wheat and other cereals which the country would require to import under this scheme would thus be 7 million tons, as compared with 10¼ million tons imported annually before the War. It would therefore mean a saving of over 30 per cent. of the tonnage employed on this service in time of peace.

The question naturally arises: Can the live stock of the country be maintained in a state of efficiency in face of the reductions of fodder which have been suggested? Fodder may be divided into two classes—coarse fodder, which is necessary for maintenance, that is for keeping an animal alive and in health, and productive fodder, which is suitable for production, such as growth, meat, milk or work. For the purpose of nance coarse fodder alone is sufficient, but for production concentrated foods, roots, good quality grass or hay are required. There is no reason to anticipate a shortage of coarse fodder, but the supply of productive fodder will be reduced from 28 to 24 million tons, reckoned as dry food Broadly speaking, therefore, it will be possible to maintain our live stock, but it will not be possible to produce so large a total output of growth, meat, milk and work.

It remains to inquire how the sacrifice may be distributed most advantageously. Both agriculture and industry would suffer if productive fodder were withheld from working horses, and some 3 million tons of concentrated foods, chiefly oats, must be allotted to horses employed in productive work. It is equally necessary to keep up the supply of milk, especially as a given quantity of fodder yields more food in the form of milk than in any other way. At least 1 million tons of concentrated food, chiefly oil cakes and wheat offals, must be reserved for this purpose. Thus, rather less than 3 million tons of productive food will remain to be divided among the remainder of the live stock of the country, or about one-half of what they used to consume in time of peace. The remaining animals are used for the production of meat for food and, as already indicated, this is apt to prove a wasteful method. How far this is the case is shown by the following figures: For every pound of dry human food which it produces a cow or a pig consumes 12 lb. of fodder, a fowl consumes 14 lb., a sheep 24 lb., and a steer no less than 64 lb. The food of cows and sheep is chiefly grass, roots and hay, which are not as a rule suitable for human food, and these animals are also valuable as producers of milk and wool. But pigs and fowls are large grain consumers, and it is essential that their diet should be restricted to such grain as is unfit for human food, supplemented by any refuse that may be available.

A great saving can also be effected by slaughtering the animals at an earlier stage. Careful and prolonged investigation has shown that the practice of fattening stock is an extremely wasteful one. The amount of fodder consumed yields a constantly diminishing amount of food, so that an animal weighing about 1,000 lb., which produces 1 lb. of food for every 8 lb. of concentrated food it consumes in the first month of fattening, requires 35 lb. to produce every additional pound of dry human food in the sixth month. It is therefore clear that the longer an animal is kept before it is finally prepared for the butcher, the more fodder it wastes on maintenance. A three-year-old steer, by the time it is ready for slaughter, will have consumed 8 tons of dry fodder, and rather more than half of this will have been used up in maintaining the vital functions of the animal. If it were slaughtered at 18 months instead of 3 years, at least 3 tons of maintenance fodder would be saved and only 30 to 31 lb. of dry fodder would be required instead of 64 lb., to produce a lb. of dry human food. It is therefore obvious that the live stock which was not required for milk or work should be treated as indicated in the general interest of the nation. Pigs and poultry should only receive such scraps and waste and damaged corn and offals as are not fit for human food. Cattle and sheep should be slaughtered in a much less fat condition than has been customary in the past, and every effort should be made to secure early maturity. The adoption of this policy will effect great economy in concentrated feeding stuffs and will, by bringing animals to the butcher more quickly, cause such a reduction in numbers as will equalise the demand for feeding stuffs and the supply.

It is, of course, important that this reduction should be so regulated as not to deplete the stock of high-class animals for breeding. But this result can be obtained if the authorities keep themselves fully informed of the stocks of animals in the country, and if they take steps, in the light of this knowledge, to prevent the slaughter of milking cows and to increase or decrease, as occasion may require, the rate of slaughter of other animals. If the total reduction in live stock brings down the numbers to such a level that the normal meat supply can no longer be maintained, the importation of meat must again be increased. But even in this case, it is clear from the figures which have been quoted that the importation of ready-made meat will make considerably less demand upon tonnage than would the importing of raw materials for the production of the same quantity of meat at home.

CORN PRODUCTION ACT, 1917.

I.—THE PRINCIPAL PROVISIONS AS REGARDS AGRICULTURAL WAGES IN ENGLAND AND WALES.

THIS article is intended for the information of persons engaged in agriculture who are affected by the provisions of the Corn Production Act relating to minimum rates of wages. It gives a general idea of the main provisions of the Act in this respect, but it must not be regarded as a full and authoritative interpretation of the measure. The Act itself should be consulted in the case of any dispute or uncertainty.

The main provisions of the Act relating to minimum rates of wages in England and Wales are set out in Part II. (Sections 4, 5, 6 and 7), and in the first Schedule to the Act. Certain definitions and additional provisions are contained in Part V. (Sections 12, 14, 16 and 17). Special provisions as to minimum rates of wages in Scotland and Ireland are contained in Section 18 and in the second and third Schedules to the Act.

1. **Agricultural Wages Board.**—The Act provides for the establishment by the Board of Agriculture and Fisheries after consultation with the Minister of Labour, of an Agricultural Wages Board for England and Wales. The main object for which the Wages Board is established is the fixing of minimum rates of wages for "workmen" employed in agriculture, that is to say, rates of wages which, in the opinion of the Wages Board, are the lowest which ought to be paid to "workmen" in the district for which the rates are fixed. The term "workmen" includes boys, women and girls, and employment in agriculture includes work not only on farms, but also on osier land, woodland, orchards, market gardens and nursery grounds.

2. The minimum rates when fixed will be legally payable as explained below.

3. **Constitution of the Wages Board.**—The Wages Board will consist of three classes of persons: (*a*) "appointed members," that is to say, persons directly appointed by the Board of Agriculture and Fisheries who are not necessarily engaged in agriculture, but are expected to form an impartial judgment as between employers' and workers' interests; (*b*) members representing employers; and (*c*) members representing workers.

4. Women are eligible as members of the Wages Board as well as men.

5. The numbers of appointed and of representative members of the Wages Board will be fixed by Regulations made by the Board of Agriculture and Fisheries, and those Regulations will also settle the methods of choosing members to represent employers and members to represent workers respectively. The Chairman and Secretary of the Wages Board will be appointed by the Board of Agriculture and Fisheries.

6. *The members representing employers and the members representing workers must be equal in number.* The appointed members must not be greater in number than one quarter of the total number of members of the Wages Board.

7. **Minimum Rates of Wages.**—It will be the duty of the Wages Board to fix *minimum rates of wages for time-work* for all classes of workers, and they may, if they think it necessary or expedient, also fix *minimum rates of wages for piece-work.* These rates, whether for time-work or for piece-work, may be fixed so as to apply universally to workers employed in agriculture, or they may be different for different districts, or for different classes of workers, or for different kinds and conditions of employment. In the case of *able-bodied men,* the minimum rates fixed for *time-work* must be such as will secure wages which, in the opinion of the Wages Board, are equivalent to payment for an ordinary day's work at a rate of *at least* 25*s. a week.* This provision does not apply in the case of boys, women and girls. In computing the wages, the value of such customary allowances as are not prohibited by law may be included in so far as the Wages Board may authorise and on a basis of value to be fixed by the Wages Board. Deductions from cash wages in respect of an allowance of intoxicating drink are illegal under the Truck Acts.

8. In fixing minimum rates, whether for time-work or for piece-work, the Wages Board are required by the Act to secure, so far as practicable, for able-bodied men such wages as are, in the opinion of the Wages Board, adequate to promote efficiency and to enable a man in an ordinary case to maintain himself and his family in accordance with such standard of comfort as may be reasonable in relation to the nature of his occupation.

9. *Any minimum rates fixed under the Act will be without prejudice to the payment,* under any agreement entered into or custom existing before the passing of the Act, *of rates higher than the minimum rates.*

10. The term "able-bodied man" means any male workman who is not incapable, by reason of age, or mental or other

infirmity, or physical injury, of performing the work of a normally efficient workman.

11. **Procedure in Fixing Minimum Rates.**—Before fixing any minimum rate of wages the Wages Board must give notice of the rate which they propose to fix, and must consider any objections which may be lodged with them within one month; and when a rate has been fixed, notice of such rate must be given by the Wages Board for the information of the employers and workers affected.

12. The Wages Board may, if they think it expedient, after due notice, cancel or vary any minimum rate fixed by them, and must reconsider any rate if directed to do so by the Board of Agriculture and Fisheries.

13. **Enforcement of Minimum Rates of Wages.**—When a minimum rate of wages has been fixed, any agreement for the payment or acceptance of wages at less than the minimum rate is void, and payment of wages at less than the minimum rate renders the employer liable to a fine of not more than £20, and to a fine not exceeding £1 for each day on which the offence is continued after conviction therefor, unless he proves that he did not know and could not with reasonable diligence have ascertained that the wages paid were at a rate less than the minimum rate.

14. In cases, however, where the Wages Board are satisfied that a worker on time-work is affected by any mental or other infirmity or physical injury which renders him incapable of earning the minimum time-rate applicable, they may grant the worker a *Permit of Exemption*; and so long as any conditions prescribed by the Wages Board on the grant of the permit are complied with, the employer is not liable to penalty for paying the worker wages at less than the minimum rate.

15. Where legal proceedings are taken against an employer for the payment of a worker at less than the minimum rate, the Court may, whether they convict the employer or not, require him to pay to the worker any arrears of wages which may appear to the Court to be due to the worker by reason of his having been paid at less than the minimum rate.

16. Any worker may complain, or may authorise another person to complain, to the Wages Board that he is being paid wages at less than the minimum rate fixed by the Wages Board, and the Wages Board may, if they think fit, take proceedings on behalf of the worker, either for the recovery of the arrears

of wages due to the worker or by way of prosecution of the employer.

17. Moreover, a worker may take proceedings on his own behalf for the recovery, as a civil debt, of any arrears of wages which may be due to him in respect of his payment at less than the minimum rate.

18. Where a worker is employed on piece-work and a minimum time-rate, but no minimum piece-rate, has been fixed by the Wages Board for the work on which he is employed, the worker may complain, or may authorise another person on his behalf to complain, to the Wages Board that the piece-rate paid to him is so low that the earnings of an ordinary workman paid at such rate would be less than he would have earned for the same work at the minimum time-rate applicable to the case; and the Wages Board in that case may direct the employer to pay the difference. The worker may recover from the employer summarily as a civil debt any sum which the Wages Board so direct to be paid.

19. *Officers* may be appointed by the Board of Agriculture and Fisheries for the purpose of investigating complaints and otherwise securing the proper observance of the provisions of the Act relating to minimum rates of wages.

20. These officers have power to require the production of wages sheets and other relevant information.

21. Persons who refuse to produce documents or give information which the officers have power to require, or knowingly furnish the officers with false wages sheets or other false information, are liable, on conviction, to a fine not exceeding £20, or to imprisonment for not more than three months with or without hard labour. The officers have power, in pursuance of directions of the Board of Agriculture and Fisheries, to take legal proceedings for the enforcement of the Act.

22. **District Wages Committees.**—The Wages Board may, and if required by the Board of Agriculture and Fisheries must, establish District Wages Committees to act for such areas as the Wages Board may determine. Any District Wages Committees established will consist of representatives of employers and workers and also of such persons as the Board of Agriculture and Fisheries may appoint. Their composition is settled by Regulations made by the Board of Agriculture and Fisheries. There will be equal representation, on a District Committee, of local employers and local workers, and at least one member of the Wages Board or other person nominated

by the Board of Agriculture and Fisheries will act on each District Committee.

23. It is the duty of District Wages Committees to recommend to the Wages Board minimum rates of wages applicable to their districts. Minimum rates of wages can only be fixed, varied or cancelled by the Wages Board itself, but no minimum rate fixed to apply to an area for which a District Wages Committee has been established, and no variation or cancellation of such rate, can have effect in that area unless the District Wages Committee has either recommended the rate or its variation or cancellation, or has had an opportunity of reporting thereon to the Wages Board.

24. The Wages Board may refer any matter to a District Committee for report and recommendation, and may also delegate to a District Committee any of their powers and duties (other than their power and duty to fix minimum rates of wages). They may also authorise a District Wages Committee to delegate any such powers to a sub-committee. Among the powers which may be so delegated is that of issuing Permits of Exemption.

25. **Expenses and Remuneration of Members.**—Expenses incurred with the consent of the Board of Agriculture and Fisheries by members of the Wages Board or a District Committee, and sums paid with such consent to members by way of compensation for loss of time, will be paid out of public funds.

26. **Provisions of the Act now in Force.**—Some time must necessarily elapse before the Wages Board and District Committees are set up and the above provisions come into operation. In the meantime an *able-bodied man employed on time-work* (but no other class of worker to whom Part II. of the Act applies) who since the commencement of the Act, viz. the 21st August, 1917, has received payment of wages (including allowances) at a rate which, in the opinion of the Court, is less than the equivalent for an ordinary day's work of 25*s*. a week, will be entitled to recover the difference from his employer as a civil debt, at any time within three months after the minimum is fixed. The value of allowances in such cases will, in case of dispute, be determined by the Court.

It is advisable, therefore, that employers should at once arrange to pay all able-bodied men employed in Agriculture on time-work, wages for an ordinary day's work equivalent to at least 25*s*. per week, and should provisionally agree with such workers as to the customary or reasonable value of any allowances which are reckoned as part payment of wages. It is illegal under the Truck Acts to reckon beer or cider or other intoxicant as allowances in part payment of wages.

II.—RESTRICTION ON RAISING OF AGRICULTURAL RENTS.

Part III. of the Corn Production Act, 1917 (*see p.* 628), is intended to protect tenants of agricultural holdings from losing through increase of rent the benefit of the minimum prices for wheat and oats which Part I. of the Act guarantees for the six years 1917–1922. With this object the Act prescribes, as the highest permissible rent, the rent which could have been obtained if minimum prices had not been guaranteed, but this applies only where the contract of tenancy has been made or varied after the passing of the Act, *i.e.*, after the 21st August, 1917.

If a tenant has reason to think that the rent he is asked to pay is higher than could have been obtained if minimum prices for wheat and oats had not been guaranteed, and he is unable to arrange for its reduction accordingly, he can require the question to be referred to a single arbitrator under and in accordance with the provisions of the Second Schedule to the Agricultural Holdings Act, 1908; but written notice requiring the question to be referred to arbitration must be served by the tenant on the landlord, either personally or by registered post, within one year from the time when the old contract of tenancy is varied, or the new tenancy commences.* The fact that a tenant has agreed to the new rent does not take away his rights in this respect.

While the arbitration or the preliminary proceedings are in progress, the tenant must pay the rent stipulated in the contract of tenancy; he cannot withhold any part of that rent on the ground that the question whether it is permitted by the Act is to be or is being determined by arbitration. But, if the arbitrator eventually determines that the agreed rent is above what the Act permits, the tenant can get back, by deduction from rent or otherwise, whatever he has paid above the rent allowed by the arbitrator, since the contract was varied or the new tenancy commenced; and the tenancy will continue at the reduced rent.

The costs of, and incidental to, the arbitration and award are in the discretion of the arbitrator, who may direct to and by whom and in what manner these costs or any part thereof are to be paid, and, in awarding costs, he is to take into consideration the reasonableness or unreasonableness of the claim of either party, either in respect of amount or otherwise. It is therefore very desirable that a tenant should not begin arbitration proceedings unless he is satisfied that he has a strong case for proving that his rent is higher than the Act permits. The arbitrator, unless appointed by agreement between the parties, is appointed by the Board of Agriculture and Fisheries.

To avoid misapprehension attention is called to the following paragraphs :—

(1) The Act does not in any way affect the existing law as to the determination of tenancies, whether by notice to quit, by the expiration of a lease, or from any other cause. It gives the Board of Agriculture and Fisheries no power to intervene, and it gives tenants no right of appeal to arbitration in such cases, even though it may be alleged, *e.g.*, that notice to quit has been given in order to obtain an increase of rent not permitted by the Act. Part III. does not enable a tenant to refer to arbitration the question as to whether the rent payable, or demanded on renewal, is a fair rent.

(2) Though the legal right of appeal to arbitration only arises *after* a contract of tenancy has been made or varied, there is nothing to prevent a landlord and an existing or would-be tenant agreeing to a rent subject to a reference to arbitration of the question as to whether the rent is in excess of that permitted by the Act. A tenant who gives up a holding, rather than agree to pay the rent demanded on renewal, cannot appeal to arbitration under the Act ; nor has he any right to resume occupation of the holding even though it may be decided subsequently in proceedings instituted by his successor, that the rent demand was in excess of that permitted by the Act.

(3) The Act does not make it illegal for a landlord to obtain the best rent he can for his land, provided that the effect of the guaranteed prices is left out of the account. The fact that the new rent is no more than may be required in order to meet the landlord's increased outgoings is no legal justification for the increase. The only point to be considered is whether the increase could have been obtained if the maximum prices had not been guaranteed.

Part III. applies to any parcel of land which is wholly agricultural or wholly pastoral, or in part agricultural and as to the residue pastoral, or in whole or in part cultivated as a market garden, and which is not let to the tenant during his continuance in any office, appointment, or employment held under the landlord, but as the Act guarantees minimum prices for wheat and oats only, the restriction which it contains on the raising of rents applies primarily to arable land or land which it is intended to turn into arable.

Corn Production Act, 1917: Part III.

" 8.—(1) The rent payable under any contract of tenancy made or varied after the passing of this Act in respect of an agricultural holding shall, notwithstanding any agreement to the contrary, not exceed such rent as could have been obtained if Part I. of this Act had not been in force, and any question as to whether the rent payable under such a contract is in excess of the rent permitted by this Section or as to the amount of the excess shall be determined by a single arbitrator under and in accordance with the provisions of the Second Schedule to the Agricultural Holdings Act, 1908;

" Provided that the rent payable under a contract of tenancy shall not be deemed to be in excess of that permitted under this Section unless notice in writing requiring the question to be referred to arbitration has been served on the landlord within one year from the commencement or variation of the tenancy.

" (2) If on any such arbitration it is determined that the rent payable under the contract of tenancy is in excess of the amount permitted under this Section, the contract shall, as from the commencement or variation of the tenancy, have effect as if the rent payable under the contract was reduced by the amount of the excess.

" (3) This Section shall not affect any proceedings by a landlord for enforcing payment of any rent except so far as the rent has before the commencement of such proceedings been determined in manner hereinbefore provided to be in excess of the rent permitted by this Section, but any rent in excess of the rent permitted by this Section which is paid or recovered before the award of the arbitrator shall be recoverable by the tenant from the landlord by way of deduction from rent or otherwise.

" (4) In this Section expressions have the same meaning as in the Agricultural Holdings Act, 1908."

Copies of the Act (price 3*d.*, or by post 4*d.*) and of any Regulations made under it may be purchased, either direct or through any bookseller, from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2.

NOTE.—*Copies of either part of this article may be obtained post free on application to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. 1.*

THE STORAGE OF POTATOES.*

It is of great importance that all potato crops should be stored under proper conditions. Even when every precaution is taken, the wastage of potatoes during the winter is considerable; under bad conditions of storage it is very great indeed, and may even amount to the whole crop.

In order that the best methods may be adopted by small cultivators, those who have not had experience in the storage of potatoes should know the chief causes of wastage. These causes are :—

(1) sweating, heating and consequent rotting; often due to insufficient ventilation,

(2) rotting: due to exposure to rain or to the potatoes being wet or immature when put into storage,

(3) injury from frost: due to insufficient protection from hard weather,

(4) decay: owing to disease in the tubers at the time of storage.

Loss is also caused by the sprouting of the tubers in spring.

It is not possible to prevent altogether losses from these causes, but, by using the best methods of storage, it is possible to reduce them very materially.

This may be done by taking care to guard against loss from each of these causes :—

(1) *Sweating and heating* occur if freshly dug potatoes are stacked in too large heaps so that air cannot circulate between the tubers. The risk of loss from this cause is greatest in the autumn immediately after the tubers have been lifted, and it is therefore important that potatoes when lifted should not be put in unnecessarily large heaps nor kept in an ill-ventilated shed or room.

(2) *Rotting from exposure to rain.*—If potatoes are lifted in wet weather, or are exposed to rain during storage, rotting is sure to occur. It is therefore necessary to protect the stored potatoes from rain.

(3) *Injury from frost.*—Potatoes are easily damaged by frost, and if they become frozen their market value

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* Food Production Leaflet No. 6.

is destroyed. Therefore every precaution must be taken to protect the tubers from frost.

(4) There are several diseases of the potato which destroy the tubers, and if diseased tubers are mixed with sound ones disease may spread. Therefore it is necessary to look over the potatoes which are to be stored and to take care that even slightly diseased tubers are not stored with the sound tubers. Before storing grade the potatoes, separating them into ware (large—above 2 oz. in weight), medium (seed size—1½ to 2 oz.) and small (chats). Very small, misshapen and diseased tubers should be given to pigs or poultry; but the diseased potatoes should not be given raw; they should first be boiled in order to prevent the germs of disease from getting into the manure and thence back on the land.

Even after careful sorting some diseased tubers are sure to escape notice and to be mixed with sound tubers. To prevent disease spreading from them to the sound tubers it is advisable to sprinkle powdered quick-lime, or a mixture of quick-lime and flowers of sulphur, among the tubers. The sulphur helps also to keep away vermin.

Lifting.—The potatoes should be ready for lifting as soon as the haulm has died down. To tell whether the crop is ready for lifting remove the soil from about a root, take up one or two tubers and note whether the skin is "set," that is, does not rub off easily. If the weather is wet they may be left for a time in the ground. In that case it is advisable to cut off and remove the haulm, as otherwise disease present in the tops might reach the tubers. Lift in dry weather and leave the tubers on the ground only long enough for the skins to dry. As the potatoes are being picked up they should be sorted and graded and the diseased tubers removed. If part of the crop is to be used for planting next year the tubers of seed size should be set aside for boxing. If none are to be kept for seed all tubers above 1½ oz. should be stored. The sound tubers may either be clamped at once, or if the quantity of potatoes and the supply of labour allow of it the tubers should be spread in heaps near the clamping ground—in the driest part of the garden or field—covered with a layer of bracken (fern) or litter to give protection from rain, and picked over *at intervals of two weeks*. If this is done some tubers which appeared to be sound when lifted will be discovered to have become diseased. By the removal of such unsound tubers subsequent wastage will be greatly reduced.

In case of an early spell of frosty weather the heaps must be protected by means of a temporary covering of litter and earth.

If this course is followed the final clamping as described below should be done about the end of November or in early December.

Storage.—Where large quantities of potatoes have to be dealt with, a clamp or pie must be made; but for small quantities a cool, dry, frost-proof shed is the best store. The potatoes are spread in layers on the floor either directly or resting on straw or bracken (fern) or sacking. The depth of the layer of potatoes must not be more than 2½ ft., or the tubers may become heated and begin to sprout. Potatoes to be used for food should be covered with straw, litter or sacking so as to keep out the light. The shed should be ventilated on all suitable occasions. During spells of specially hard weather every care must be taken to keep out frost, for example, litter may be scattered lightly and thickly over the heap.

Storage in the Larder.—Where there is no shed suitable for use as a store and where the quantity of potatoes to be stored is not too great the tubers may be placed in *thick* bags and kept in a larder. Quick-lime or lime and flowers of sulphur lightly sprinkled among the tubers will help to keep down disease. During late autumn they should, if possible, be looked over once a fortnight and diseased tubers removed. In winter old sacking thrown over the sacks will protect the potatoes from frost, and in very severe weather extra covering should be put on at night and removed in the morning, or at all events at the end of the frost.

Storage "in the Roof."—In many small houses there is space beneath the roof which in the absence of more convenient storage-room may be used.

The potatoes should be put in boxes and the boxes stood on boards on the rafters and covered with old sacking or with several layers of crumpled newspapers. The potatoes should be inspected occasionally and diseased tubers removed. In severe weather the boxes must be protected from frost.

Storage in Cellars.—If no more suitable place is available potatoes may be stored in a cellar; but in that case careful attention must be paid to *ventilation*, particularly during the first months of storage. The door should be kept open and the window also when the weather is not too rainy.

If the cellar has a dry earth floor the potatoes may be laid directly on it; but if the floor is damp the potatoes may be placed in boxes resting on bricks; or a layer of straw may be laid on the floor and the potatoes placed in shallow heaps 8 or 10 in. deep. The heaps should be covered lightly with straw or with dry heather, bracken or dry branches. The potatoes should be looked over from time to time and diseased tubers removed.

Storage in Clamp or Pie.—Storage in a clamp or pie is in many respects the best method, but it cannot be used if there is danger of loss by pilfering.

To make a Clamp or Pie.—Select the driest part of the ground. Mark out a strip 3 ft. 6 in. wide and long enough to take the potatoes to be stored.

Having graded the potatoes pile them in a heap with sides as upright as possible—in the shape of the letter A. Cover the sides and ends of the clamp with a layer of long wheat straw 4 in. in thickness, taking care that the lower ends of the straw are pressed close to the ground, for it is along the edge of the clamp that frost most often gets in. The long straw layer should reach almost to the top of the potatoes. To keep the straw in place, throw a layer of earth along the lower edge of the clamp. In order to keep off rain, a covering of long straw (wheat or barley—not oat straw) is placed over the ridge so that the ends *overlap* the straw at the sides. By this means any rain which falls will run down the outside and not into the clamp. The straw may be kept in position by means of a layer of earth 3 in. thick covering the sides from the base up to 4 in. from the cap of the ridge.

At the approach of winter the clamp must be finished. This is done by covering the clamp except along the middle of the ridge with a *thick* coat of soil dug out from along the sides. As a result of the digging a drainage trench a foot or so wide and 6 in. deep is formed. An outlet is cut in the trench to allow water collecting there to drain away. The earth is worked on the sides and ends with a spade, and is made firm and smooth as the clamping proceeds. A thickness of 6 in. of earth is quite sufficient to give protection against moderate frosts; but in very severe weather, such as that experienced last winter, even 12 in. may not be enough. It should be remembered, however, that too much soil encourages the stored potatoes to grow in the clamp. Finally put a thick layer of short litter along the ridge.

For *small* lots, of one ton or less, the clamp may be made in the shape of a cone, with a round base, built up as high in the centre as the base allows and well strawed with as straight straw as can be obtained.

Unless the clamp shows signs of giving way owing to the rotting of the tubers, it may be left undisturbed until February. It should then be opened and the potatoes inspected. If left longer they are likely to sprout vigorously, and in that case much of the goodness in the potatoes will be lost.

Storing Seed Potatoes.—Every care should be taken to prevent the exposure of seed potatoes to cold; for even at a temperature not low enough to kill the tuber the eyes may be permanently injured.

Scotch and Irish seed potatoes give the largest yield. Yields almost, if not quite, as large are obtained from "once grown" Scotch or Irish seed, provided that the seed is from Scotch or Irish potatoes grown for one year in a good potato district, for example, Lincolnshire, the Wisbech district of Cambridgeshire and parts of Yorkshire. By "once grown" Scotch or Irish seed is meant seed of potatoes of Scotch or Irish origin grown for one year in this country.

Because of the importance of obtaining seed not only true to name but also of known origin, growers should place their orders with firms of established reputation as soon as possible after they have decided upon their requirements for the coming year.

Lifting.—If it is intended to save tubers for seed purposes, the best course is to set apart a portion of the crop and to lift it before the tubers are fully ripe, for it is a well proved fact that immature tubers make the best sets.

Selection of Seed.—*First Earlies.*—Seed of first early varieties should consist of uniform, clean, ware sized tubers.

The selected tubers should be allowed to lie on sacking or on the ground for a few days and should be turned occasionally so that they become greened. By this means the keeping quality of the sets is improved.

The tubers should then be placed "crown end" uppermost in shallow boxes or trays, or on shelves one layer deep, in a frost-proof, cool place, where they get as much light and air as possible. Tubers so " boxed " develop two or three, strong, green sprouts instead of a large number of weakly shoots, which they produce if they are pitted or kept in the dark. Sets (seed) so treated need not be cut at planting time nor need any of their sprouts be removed.

Second Earlies, Main crop and other Varieties.—The seed of these varieties should also be selected at the time of lifting. The tubers need not be so large as in the case of the first earlies. Tubers about the size of a hen's egg and of not less than 2 oz. in weight will make good seed, though, if required, larger tubers may also be used. Wherever it is possible the seed should be placed two or three layers deep in boxes, and the boxes stored in a well-lit, airy, but frost-proof place, such as a shed, outhouse, or disused room of a dwelling-house.

Where the quantity is too large for the seed to be treated in this manner, it must be clamped. When the clamp is opened in the spring, any sprouts which have been formed should be removed.

FARM ACCOUNTS: WINTERING LAMBS ON TURNIPS.

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THE object of this note on a farmer's experiences in wintering lambs on turnips in the year 1915–16 is to supply an example of how scientific book-keeping can assist the farmer in the management of his business. It is not to be inferred that the results shown here would necessarily be realised on the generality of farms, but on the farm in question, a mixed holding in the Midlands, the record of his operations, translated into figures, has been the means of bringing about a profitable change of management.

The custom for some time had been to grow a certain area of roots upon which the lambs were wintered with cake and corn, and from which they were sold off fat from about Christmas onwards. The prices realised seemed satisfactory, and the land was benefited no doubt by the treading and manuring, but when the test of book-keeping was applied the results were shown to be unprofitable. In 1915 the turnips and swedes occupied an area of 26 acres, and the cost of growing the crop was as follows :—

Cost of growing 26 acres of Turnips and Swedes in 1915.

	£	s.	d.
Manual labour	50	12	2
Horse labour	38	19	4
Purchased manure	20	16	3
Farmyard manure	53	3	8
Rent and rates	31	8	6
Seed	2	16	9
General expenses (including depreciation on implements)	28	19	0
	£226	15	8

Manual labour was calculated from a daily labour-sheet, and the amount charged includes a proportionate part of all payments in kind. Horse labour was recorded in days, and the cost of a day was worked out at the end of the year, when the total number of days worked by the horses and the total cost of keeping them was known. Purchased manure was charged at cost, the labour of carting and distribution being included in manual and horse labour. Farmyard manure was charged at the cost of the straw and food residues composing it. General expenses represent the proportion of the overhead charges, including depreciation on implements, chargeable against this crop, the division between the various departments being made upon the basis of the gross costs.

The total gross cost of the crop thus appears to be £226 15*s.* 8*d.*, but from this certain deductions have to be made. (1) The roots having been fed on, all the manures are carried forward, according to the local farming custom, to the charge of the next crop. (2) Turnips being a cleaning crop, and some of the cultivations performed being necessary to clean the land rather than to grow the roots, a certain proportion of the cultivation and of the general expenses must also be carried forward. The exact figure representing the amount to be carried forward should be arrived at for any root crop by an inspection of the record of the work done, as the operations will vary with the seasons, the condition of the land, and so on. Experience gained in farm accountancy at the Institute for Research in Agricultural Economics points to the fact that about one-third of these expenses in connection with the root crop represents, under average conditions, the charge due solely to cleaning, and in the case under consideration one-third of the cost of cultivations and of general expenses have been carried forward. The total cost of £226 15*s.* 8*d.* is therefore reduced by £20 16*s.* 3*d.* in respect of purchased manures, £53 3*s.* 8*d.* in respect of farmyard manure, and £39 10*s.* 2*d.* (*i.e.* one-third of manual labour, horse labour and general expenses) in respect of cleaning costs, bringing the net cost of 26 acres of turnips and swedes to £113 5*s.* 7*d.*

The lambs in question consumed 9⅝ acres of the whole area. There were 173 of them, and the cost of wintering them in 1915–16 works out as follows :—

	£	s.	d.
Manual labour	20	5	0
9⅝ acres turnips and swedes	42	9	7
Corn, cake, etc., *less* manurial residues ..	46	5	8
General expenses	5	13	6
Total cost of wintering 173 lambs ..	£114	13	9

This represents about 13*s.* 3*d.* per head, and the sheep as sold off realised an average figure of 60*s.* 5*d.*

It is now possible to consider the financial results of the management of the lambs. Deducting the cost of wintering from the price realised, we get a figure of 47*s.* 2*d.*, which is to be compared with the price of store lambs at Michaelmas, 1915. Now the farmer himself had purchased other store lambs at this date, which cost him 50*s.*, and from his observations at fairs and sales at this time, he concluded that his own lambs would have made from 45*s.* to 50*s.* per head. It appears, therefore, that he had received nothing at all by way of reward for his own services, for interest on his capital, and for risk involved in wintering these sheep, and that a more profitable plan would have been to have sold them in the autumn as stores, and to have arranged the cropping of his land with that purpose in view. Nothing must be inferred from the result as to the general wisdom of wintering sheep on turnips, but on this particular farm the farmer was probably justified in drawing the above conclusion, for the results for the year given proved to be only a confirmation of those for the previous year.

PEASANT CO-OPERATION IN RUSSIA.

(Abstract of a Russian pamphlet by A. E. Kuluıjnuı.)

E. A. BRAYLEY HODGETTS.

The great strides which the co-operative movement has made in Russia in recent years are perhaps insufficiently known in this country, and for this reason the following abstract of a pamphlet which appeared in Russia just before the outbreak of the War may have especial interest.

The author describes the changes which have taken place in Russian agricultural life during the last 30 or 40 years, and shows that the increase of population had necessitated the abandonment of old and obsolete methods. A painful picture is painted of the hopeless financial and economic condition into which the usurer had got the peasants, for, instead of paying for the produce in money he did so in kind at inflated prices, and thus was rapidly ruining the rural population of Russia. The usurer, however, was not the only curse of the peasant. Agricultural produce frequently had to go through from 6 to 10 hands before the final market was reached, and each of the middlemen had, of course, to make a profit. As the market price was not dependent on the conditions obtaining in Russia, but was controlled by Hungarian, Indian, Canadian and Australian competition, it was always the peasant who suffered.

Such was the state of things that obtained in rural Russia some 20 or 30 years ago, and it is consequently not to be wondered at that the peasant became more and more impoverished and that famines were the order of the day. The conditions in Western Europe were not dissimilar, but there the peasants found a remedy in co-operation.

The example thus set has been followed by Russia, where a number of agricultural societies have of late years been founded by the peasants. These societies, composed of members of both sexes, hold meetings at which the needs and requirements of the members are discussed; they establish local public libraries; public lectures and discussions are held under their auspices; agricultural schools are founded, experimental and demonstration fields are established, model farms as well as nurseries for fruit trees are created; and so forth. Improvements in seeds and manures, agricultural implements and machinery, etc., are discussed, and agricultural shows are held for the exhibition and trial of agricultural machinery. The societies also make it their object to supply their members with various agricultural requisites at reasonable prices, and erect for that purpose stores for agricultural implements, seeds, manures, timber, iron, tiles, etc. Further, they effect the sale of peasant produce by collecting and marketing grain, hemp, hay, eggs, etc. Finally, these agricultural societies have power to establish in villages credit associations, co-operative supply stores, bee-keeping and poultry-keeping societies, and similar useful institutions.

Perhaps the most important privilege of these societies, however, is the right of raising with the supreme agricultural authorities questions bearing upon the agricultural requirements of the district which they represent. The societies are legal corporate bodies and have the right to own movable and immovable property, conclude agreements, and generally transact business in their own name in accordance with the laws of the country. The liability of the members is, however, limited to their annual subscriptions.

The activities of the majority of existing agricultural societies in Russia are summarised as follows :—

(1) Propagating among the peasantry the best and most profitable methods of husbandry ;

(2) Assisting the peasants to purchase all the requirements needed for the improvement of their holdings, such as tools, machinery, seeds, manures, etc. ; helping them to obtain cheap articles of good quality, and wherever possible without the intervention of the middleman ;

(3) Collecting the peasant produce and marketing it in bulk ; and

(4) Facilitating, through the intermediary of the society, the use of such implements and machinery as the peasant could not individually afford to acquire.

It is stated that the peasantry have already appreciated the benefits to be derived from these village agricultural societies. Formerly agricultural societies were formed exclusively by the country gentry and were principally established in towns. The peasant societies, however, only appeared in the villages in recent years, but immediately grew and multiplied at a great rate. Thus, whereas up to 1901 there were no more than 200 such societies in existence, in 1902 this number had doubled, in 1905 there were more than 700, and the latest returns show that there are now more than 2,300. The provinces possessing the largest number of such societies are

Poltava, Samara, Saratoff, Perm, Vitebsk, Vyatka, Tchernigoff, Koursk, Novgorod, and Petrograd. Of course these numbers are very small compared with those of Western Europe, but it is maintained that they are increasing rapidly.

As showing the utility of the societies the operations of a society in the Province of Poltava, given in their last report, may be taken as an illustration. The peasant members held 12 meetings during the year at which papers on the following subjects were read by experts and subsequently discussed: "The agricultural needs of the peasants," "The forage market," "The various kinds of fruit trees," "Dung and artificial manures," "Emigration," "On the formation of a credit association and co-operative stores," "On the purchase of sheep of the Karakul breed," etc. Nevertheless, however useful such occasional papers may be, many societies consider this insufficient, and offer a permanent appointment to an agricultural adviser in order that he may be constantly consulted by the members. In the purchase of implements and seed, in the adoption of new methods of husbandry, and in connection with cattle and horses, the advice of such an expert, always available, is invaluable.

Many societies subscribe to the leading technical journals, have lending libraries and reading rooms, and have the latest agricultural publications on sale.

As papers and descriptions are not always sufficient to convince individual peasants of the excellence of the machinery or implements, agricultural shows are held at which competitions take place; practical demonstrations are given, and considerable sums are awarded as prizes.

A number of societies have started experimental fields, acquired either by purchase or by lease, only a few acres being required for the purpose.

The peasants are thus learning that new methods must be introduced and that the old 3-course system is antiquated, and the scarcity of forage has led to the adoption of 4-6 and even 8-course systems. The most popular seems to be the 4-course rotation: grass, winter crops, roots, oats. Various districts recommend systems in accordance with the local conditions. Some of the societies do not limit their operations to purely agricultural matters; in certain districts technical schools have been established by societies, where peasant girls are taught weaving; other societies have erected training smithies, repairing workshops, etc.

A very useful function performed by the rural agricultural societies is the mechanical cleaning of seed, thanks to which the crop yields have been enormously increased (to the extent of 20 per cent. and more), and better prices obtained for the crops. This work, which was initiated in 1899, has been making great progress, the societies providing the necessary winnowing machinery. Excellent results have been obtained in various districts. Drills have also been introduced by these societies, and even by the Zemstvos, and hired out to the peasants.

The laying down of good grass for cattle has also received a great stimulus, and is now being conducted on scientific lines, the local societies in many cases having succeeded in obtaining subsidies from the Department of Agriculture for the purchase of suitable seed.

The question of cattle and horse-breeding has been similarly placed on a satisfactory basis by these societies which provide bulls and stallions, etc.

The co-operative purchase of requirements and the joint sale of agriculture produce are, of course, the principal problems of the peasants. In Western Europe the problem has long been solved by co-operative associations, but in Russia the entire business, including the erection of storage accommodation, the sale of grain, etc., had to be carried out by the local rural societies. It was not until 1908 that the Government sanctioned the formation of co-operative associations and drew up model by-laws and articles of association.

The rural societies have, however, filled this gap by opening co-operative stores where the peasant could purchase on easy terms, and at the lowest possible prices, the latest types of agricultural machinery, and had further the benefit of the advice of a disinterested expert attendant. In several districts the societies have built their own flour mills for the benefit of members.

Wholesale dairy-farming on a large scale is also carried out by certain societies on behalf of their members. Another interesting operation of the societies consists in the co-operative renting of land. It was found that large tracts of land rented by a society could be obtained on much lower and better terms than would be accorded to individual peasants in respect of a few acres. Moreover, by taking large tracts, the society could introduce a satisfactory scientific rotation of rops.

The co-operative sale of agricultural produce is certainly no less important an achievement. In the old days the Russian peasant was the sport of a number of circumstances over which he had no control. He was always in debt, mostly in the hands of a usurer, and was compelled to sell his produce at a certain time; his needs were exploited, and he was thus in a vicious circle which was annually contracted by the usurer, who was often at once the capitalist and the buyer, and from whom there seemed to be no escape. The rural agricultural society has now come to his rescue. The grain is collected and sold in trucks at better prices, for middlemen and usurers are avoided, and the society can store the grain and take advantage of the market, or await better prices. In order to make this possible, mutual credit associations have been called into being, by means of which the peasant is financed and freed from the clutches of the usurer, or " fist," as he is colloquially called. The beneficent collaboration of rural agricultural societies and these mutual credit associations has been more particularly manifested in the province of Samara. On exhibiting a receipt for produce held by the stores the peasant can obtain an advance of 75 per cent. of the value of the produce. In some places where grain elevators have been erected, the Government has come to the assistance of the society and advanced the required funds on very reasonable terms.

As yet purely commercial agricultural associations are still in their infancy in Russia. Co-operative dairy-farming and the egg industry have both developed, however, and various organisations have co-operated, both the Zemstvos and the Government having assisted in the co-operative movement. There are some very interesting cases of the growth of particular organisations from small beginnings, with very modest funds, until they have gradually developed into large undertakings with considerable capital.

THE EMPIRE SETTLEMENT COMMITTEE'S REPORT.*

The Empire Settlement Committee was appointed by the Rt. Hon. W. H. Long, M.P., Secretary of State for the Colonies, in February of this year, " to consider and report on the measures to be taken for settling within the Empire ex-soldiers who may desire to emigrate after the War; to collect and prepare for distribution to intending emigrants of this class information which shall show clearly the nature of any facilities afforded by the Governments of the Dominions and States; and to make recommendations as to the steps which should be taken by His Majesty's Government in concert with the Governments of the States and Dominions for the constitution of a Central Authority to supervise and assist such emigration."

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* [Cd. 8672.] London. August, 1917. Price 9d. net.

The Committee, consisting of rather more than thirty members—including the Rt. Hon. F. D. Acland, M.P., representing the Board of Agriculture and Fisheries, Mr. Clive Bridgeman, M.P., Parliamentary Secretary to the Ministry of Labour, Mr. Macpherson, Under-Secretary of State for War, Mr. G. H. Roberts, Parliamentary Secretary to the Board of Trade, and the Agents-General of the various Dominions—began work in April and completed their task at the end of July. As their numbers were rather large, with a view to facilitating the inquiry, the Committee immediately formed two Sub-Committees, a General Purposes Committee to examine into opportunities for the settlement of ex-service men in the overseas Dominions, and a second Committee to consider the provisions for agricultural settlement made to induce discharged soldiers to remain at home. The first half of the Report is concerned with the examination of these two opposing schemes.

After recording their sense of the profound change of attitude towards emigration brought about by the War, in that it has emphasised both the essential unity of the Mother Country and the Dominions and the necessity of examining our emigration system from the standpoint of the Empire as a whole, the Report proceeds to pass in review the Government schemes for agricultural settlement at home. Some account of these was given in the June number of the *Journal*.* At present the schemes are on a very small scale: in *employment*, securing only the establishment of a minimum wage of 25*s*. a week for agricultural labourers and the guarantee of a minimum price for wheat and oats from 1917-1922, and as regards *settlement*, providing, in England, for not more than 240 men or (including their wives and families) for 1,200 persons.

Oversea schemes for land-settlement fall into two categories: (1) *Settlements on Crown Lands*, and (2) *Settlements on land controlled by Private Companies*. A summary of the

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* See p. 326.

Government schemes will be found in the adjoining table; as to the schemes proposed by private companies, the Committee state that they have not received much evidence about the facilities offered, and suggest that ex-service men "should not be encouraged to avail themselves of them until each offer has been carefully investigated." In the case of all grants of land for farming, fruit-growing. dairying, and so forth, whether the land is controlled by the Government or by private companies, the Report lays very great emphasis on the need for capital and experience. The capital required varies from a very small sum in the Prairie Provinces of Canada, Ontario and New Brunswick, to £1,000 or £1,500 in the Union of South Africa and Rhodesia. In some cases the land is a free grant and in most cases the payment for the land is distributed over a number of years, varying from five years in Quebec (during which time the settler must reside on his holding, build a house to be completed in the first 18 months, and clear 15 acres) to thirty years in Western Australia. Moreover, the Governments or Agricultural Credit Banks are ready to advance money for improvement at a moderate rate of interest; hence the amount of capital required is smaller than at first sight appears, and this is particularly true in the case of Canada and Australia. Still some capital is in every case almost essential. Much more indispensable, however—and on this the Committee lay most particular emphasis—is the necessity for previous agricultural experience; this should, in general, be acquired locally, either by employment on a training farm or at some similar institution or by working for a time on another man's farm. If, as appears probable, there should be few transports available for conveying emigrants to the oversea Dominions during the first few months after the War, the Committee recommend that ex-service men should employ the time of waiting by getting some knowledge of agricultural work in this country, on farms already existing or to be established by the Y.M.C.A., the Church Army, and other public bodies. The Committee further attach considerable importance to the suggestion that the Home Government should provide soldiers while they are awaiting demobilisation with instruction in carpentering, building, and so forth.

The acquiring of local "colonial experience" by intending settlers has the additional advantage of lessening the transport difficulty by necessarily postponing the emigration of wives and families. There is seldom adequate accommodation for married labourers on farms abroad, and the pay which a man receives whilst under training is not large. Moreover, a man who has been in a State or Dominion for a short period can, in some cases, obtain reduced passages for his wife and family. The whole question of female emigration is, the Committee believes, most important and the essential foundation of all effective Empire settlement. In the case of widows and orphans, women relatives and fiancées of ex-service men, women agricultural and munition workers and others displaced at the end of the War, better openings will be available overseas than any which they could secure at home, and the Committee add that, in their view, there would be far greater justification for the grant of monetary assistance towards the emigration of the wives, families, and other relatives of ex-service men than there would be for such assistance towards the emigration of the men themselves. In all cases, however, the oversea Governments concerned would have to be satisfied that the proposed immigrant is one whom they would welcome.

The second half of the Report is concerned with suggestions for putting the information about agricultural openings within the reach of all service men; it also investigates the question of transport and the question of finance, and outlines the constitution of a central Emigration Authority to be created without delay.

The Committee close their Report with the confidence that the generous action of the Dominions in placing the men from home on the same footing as their own men in land settlement will tend still further to the consolidation of the Empire.

THE following Notes have been communicated to the Board by Professor Leplae, and Messrs. Van Orshoven and Vendelmans:—

Intercropping and Catch Cropping in Belgium.

Intercropping and catch cropping are special features of Flemish agriculture, as distinct from the practice in the Walloon provinces, and are largely practised on the light fertile soils of Flanders and Brabant, where a first crop can be harvested sufficiently early in the year to allow the second crop to mature before the winter.

Catch Cropping.—On the larger farms, catch crops are more generally grown than intercrops, or in other words the land is usually cleared of one crop before the next is sown.

The catch crops used in Belgium are as follows :—

Time of Seeding.	*Crop.*
March—April	Red clover in corn.
June—July	Turnips after flax.
July	Turnips after rye or barley.
	Spurrey after rye.
July to August	Lupins for ploughing in.
August to September ..	Italian rye-grass (for spring fodder)
	Crimson clover ,, ,,
	Green rye ,, ,,

Turnips are much the most important catch-crop in Belgium. A quick-growing variety is required, such as Pomeranian White or Long Alsatian, and they are sown as early as possible, in fact often before the corn is carried. The seed is drilled on the fresh furrow, if possible the same day as the land has been ploughed, and the land is dressed with nitrate of soda and superphosphate. A valuable fodder is obtained in early winter and forms the staple food of milch cows until January, when it is replaced by mangolds.

Spurrey is a typical light-land crop. The rye stubble is broken up, and 15 to 20 lb. of seed are sown broadcast, giving some 4½ tons of green fodder in about 7 weeks. It is said to communicate a remarkably fine flavour to butter.

Belgian farmers generally reckon that a catch crop may be grown every other year, and thus increase the crop area of their farms by 30 to 50 per cent. Such a system of continuous cropping, however, can only be maintained with heavy manuring, farmyard manure is applied every second year, liquid manure and some artificials nearly every year.

A typical rotation with its manurial dressings is given below —

	Farmyard Manure. Tons.	*Nitrate of Soda. cwt.*	*Superphosphate.* cwt.*	*Muriate of Potash. cwt.*
1st year —				
Chicory sown April to May, dug in October, 12 tons of roots per acre	10–12	2½	5	—
2nd year :—				
Flax, harvested in June	—	1	—	—
and followed by turnips fed in autumn and winter .. .	—	1	1½	—
3rd year :—				
White haricot beans ..	10	—	5	—
4th year :—				
Rye followed by turnips or carrots	—	1½	—	2

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* On the lighter soils, basic slag is preferred to superphosphate, the quantities being increased by about 50 per cent.

	Farmyard Manure, Tons.	*Nitrate of Soda, cwt.*	*Super-phosphate.* cwt.*	*Muriate of Potash. cwt.*
5th year :—				
Potatoes	10	2	5	—
6th year :—				
Rye, followed by turnips or carrots ..	—	1	—	—
7th year :—				
Large sugar mangolds yielding 30 tons per acre	10–12	2½	5–6	2
8th year :—				
Winter barley in which clover is sown in spring. Barley is cut in June and clover gives one cut ..	—	1½	—	—
9th year :—				
Clover, 2 cuttings, turf ploughed under ..	—	—	—	—
10th year :—				
Early oats, followed by rye, crimson clover or Italian rye-grass sown end of August, followed by chicory ..	—	1½	2	—

Intercropping.—In the market-garden districts of Malines and Louvain intercropping is extensively practised, especially where the soils are light enough not to pack hard with treading. Typical associations are given below :—

1. Early cabbage or cauliflower intersown with spinach or cabbage lettuce, or with radishes and lettuce.
2. Carrots interplanted with cabbage, lettuce, or scorzonera.
3. Early potatoes intersown with radishes, which are cropped before the potatoes are earthed up.
4. Late cabbage interplanted with an early variety, which is marketed before the main crop attains full size.

In a general way it may be said that all vegetables which occupy the soil for some time are intercropped with spinach, early carrots, radishes, chervil or lettuce.

Where early peas are grown in beds carrots are sown among the peas, and occupy the ground after the latter crop has been harvested. Peas are often planted in every third or fourth row of a potato crop ; a single pea of a dwarf variety is pressed down in the centre of each potato plant ; the pea grows up with the potato, and when the pods are ripe it is pulled up bodily. The practice, however, cannot be recommended with green peas, as too much treading of the soil then takes place in picking the crop. Cabbages or Brussels sprouts are sometimes planted between all but the very late varieties of potatoes.

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* On the lighter soils, basic slag is preferred to superphosphate, the quantities being increased by about 50 per cent.

They are planted in the furrows after the potatoes have been earthed up and do not in any way interfere with the growth of the potatoes.

Though intercrops are typical of intensive rather than extensive cultivation, the two following crop associations are commonly met with on the larger farms in the sandy (old heather) districts of Northern Belgium :—

1. *Carrots in Corn.*—Carrot seed is broadcasted in wheat, rye, or winter barley in February or March. The rate of seeding is about one-third heavier than when the crop is drilled in the ordinary way, and no attempt is made to cover the seed; but the soil is kept comparatively moist by the shade of the corn and germination is generally satisfactory. By the time the corn is ripe, the carrots have usually made sufficient growth to get the tips of their leaves cut when the corn is harvested, but no appreciable damage is done. After harvest the ground is harrowed and the carrots are lifted about the end of November. An Intermediate carrot is grown and it is used for stock feeding, but there is no reason why a horticultural variety should not be equally successful.

2. *Serradella in Corn.*—On very light land serradella seed is broadcasted in April and in a corn crop at the rate of 25 lb. per acre. It is harrowed in and gives a good crop of green fodder for grazing and cutting in autumn, but is killed by severe frosts during the winter.

Maintenance of Supplies of Hay and other Fodder Crops.*

THE ploughing up of grass land during the coming autumn and winter will necessarily reduce the area available for hay and pasturage in 1918. An endeavour should be made to compensate for the ploughing of meadow land by growing hay on land which has hitherto been depastured, but in many cases this will not be possible, and in view of the necessity of maintaining the fodder supply of the country, special measures must be taken by many farmers to provide for the winter of 1918-19. The following suggestions are made with the object of safeguarding the fodder supply :—

1. During the coming winter (1917-1918) the greatest possible economy should be exercised in the use of both hay and straw wherever possible; straw should be used instead of hay for feeding purposes, and material such as bracken, peat moss, or sawdust should be used for bedding. (See Special Leaflet, No. 38.)

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* Food Production Leaflet No. 7.

2. It is expected that the area of rotation grass in 1918 will be less than that of previous years, and it will therefore be necessary to save a larger proportion of permanent grass for hay than usual. The reduction in the area might, to some extent, be balanced by the greater production per acre which could be secured from much of the remaining grass land (both pasture and meadow) by suitable manuring.

3. Though the essential thing is to produce from the arable land direct human food—grain and potatoes—some of it may be set aside for the production of fodder crops for stock. For example, the farmer who is able to plough 20 acres of grass land to add to his acreage under corn may be able, despite the shortage of labour, manures, etc , to borrow a little more from the grass land on which to grow forage crops to replace the hay and grass which he is losing. Dairy farmers, again, can reduce their demand for purchased foods if they will replace a little of their grass by arable land, with its greater productive capacity. On many such farms an increase in the area of arable land could be made without throwing an impossible burden on the existing staff of men and horses, thus enabling the farm to contribute to the national supply of grain without reducing the total quantity of home-grown forage.

Vetch Mixture Hay.—One of the most useful crops for the object in view is vetch hay which, if sown in early autumn, will be ready for mowing in most parts of the country not later than the end of June, in time to allow of a subsequent crop of cabbages, turnips or rape, or at worst a half-fallow in preparation for autumn-sown wheat. It is recommended that wherever possible such a crop should be taken on part of the land intended for roots in 1918 and that a certain area be taken after old grass. In order to keep the vetches off the ground, and facilitate cutting, it is advisable to sow some winter oats, or barley, with the vetches. A suitable mixture for sowing under average conditions would be : 1 bush. of winter vetches, 1½ bush. of winter oats and 1 bush. of winter barley. If available, ½ bush. of beans might be substituted for part of the cereals. In order to secure the best results the ground should be clean and in good heart, but rather than lose time in cleaning the ground it is better to give a little nitrogenous manure in early spring in order to induce a sufficiently strong growth of crop to keep down weeds. The subsequent root crop or half-fallow will give a good opportunity of dealing with weeds. It is important to get the vetch crop well established before winter sets in. If sown in September or early October the crop should be fit to cut by about the middle of the following June. Judgment is needed in deciding when to cut the crop. If cut too young, the vetch leaves wilt and fall to dust; if left uncut too long, the crop becomes fibrous and stock refuse it. The right time to cut is when the seeds in the pods at the base of the plant are about half-formed. The method of harvesting the vetch mixture is precisely the same as in the case of "seeds" hay.

As soon as possible after the vetch mixture has been cleared, the soil should be ploughed, but if, as will frequently be the case, other work of the farm makes it impossible to plough at once, a preliminary cultivating or discing should be given in order to kill weeds and prevent the surface becoming too hard and dry for ploughing later.

As an illustration of the way in which it is possible to combine the two objects of increased corn production and maintenance of dairy stock, the following definite case may be considered:

A diary farm of 100 acres (50 pasture, 30 meadow, 20 arable) at present maintains 30 cows, a team of horses, and a few young stock. The arable land is farmed on a 4-course rotation, there being 10 acres corn, 5 acres green crop and 5 acres clover and rye-grass (mown for hay).

The total production of food may be estimated to be as follows:—

Summer—
Grazing of 50 acres Pasture.
,, 30 ,, Aftermath.
Cabbage and Maize from 1 acre for use on pastures.

Winter—

Hay from 30 acres Old Meadow	say 45 tons.	
,, 5 ,, Clover, 1st crop ..	,, 10 ,,	
,, 5 ,, Clover, 2nd crop ..	,, 5 ,,	
	—	60 tons.
Straw from 10 acres Corn	,, 15 ,,	
Less—used for thatching, bedding, etc.	,, 5 ,,	
	—	10 ,,
Roots from 2 acres Mangolds	40 ,,	
,, 2 ,, Swedes and Turnips ..	,, 30 ,,	
	—	70 ,,
"Seconds" or "Tail Corn" from 10 acres	,,	1 ton.

If the area of arable land were doubled by ploughing up an additional 20 acres of grass, and part of the root-break cropped as indicated on p. 650, the cropping of the farm might be altered to the following :—

Pasture	45 acres.
Old Meadow	15 „
Corn	20 „
Clover and Rye-grass	10 „
Mangolds	4 „
Swedes	1 acre.
Vetches, followed by Maize, Cabbage and Turnips or Rape	5 acres.

In this case the total production of food which might be expected would be as follows :—

Summer—

Grazing of 45 acres Pasture.
„ 15 „ Old Grass Aftermath.
„ 10 „ Clover and Rye-grass Aftermath.
Vetches from 1 acre.
Cabbage and Maize from 2 acres.

Winter—

Hay from 15 acres Old Meadow	say 22½ tons.	
„ 10 „ Clover, 1st crop	„ 20 „	
Vetch Hay from 4 acres	„ 10 „	
	—	52½ tons.
Straw from 20 acres Corn	„ 30 „	
Less—used for thatching, bedding, etc.	„ 8 „	
	—	22 „
Roots from 4 acres Mangolds	„ 80 „	
„ 1 acre Swedes	„ 18 „	
„ 3 acres Turnips, etc.	„ 36 „	
	—	134 „
"Seconds" or "Tail Corn" from 20 acres	„	2 „

It will be admitted that the supply of food grown under the second system of cropping is at least as great as that grown under the first ; no reduction in stock or extra purchase of food would be necessary, although the production of grain for sale has been doubled.

The above statements apply to the system when the 20 acres of new arable land have been brought into the rotation and the system is well established. The transition period is naturally the most difficult time, but with care there need not be even a temporary reduction of stock.

For instance, if, for 1918, 15 acres of the grass land are broken up—5 in time for the autumn sowing of vetches and oats—the arable cropping for 1918 might be

20 acres Corn.
6 „ Clover and Rye-grass.
5 „ Mangolds and Swedes.
5 „ Vetches, followed by Maize, Cabbage, and White Turnips or Rape.

If next year the remaining 5 acres of grass were brought under the plough and a double area of vetch hay were taken the cropping for 1919 would be :—

20 acres Corn.
5 ,, Clover and Rye-grass.
5 ,, Vetch Hay, followed by half-fallow.
5 ,, Mangolds and Swedes.
5 ,, Vetches, followed by Maize, Cabbage, etc.

In 1920 the cropping would be the rotation set out on p. 652.

"Black-Leg" or Black Stem-Rot of Potatoes.

ALTHOUGH not so widely recognised as it should be, "black-leg" of potatoes (*Bacillus phytophthorus* or allied species) is a common disease in Britain. It is well known on the continent of Europe, where it was first studied in detail, and it is to be found in practically every country where the potato is cultivated. The losses caused by black-leg are often not regarded as serious, since the disease is not epidemic in character as is the ordinary potato blight (see Leaflet No. 23). Nevertheless, the losses in the aggregate reach in an average season a considerable amount, and in unfavourable and wet seasons they may be really severe.

The disease is caused by bacteria ; and although the parasitic organisms found in the various countries in which the disease has been investigated show certain differences and have received different names, yet recent researches tend to show that most of the organisms described are, if not actually identical, very closely related. For practical purposes the disease may be regarded as being caused by the same species of bacterium.

Symptoms of the Disease.—Black-leg is one of the earliest potato diseases to show itself. Affected plants may be seen as early as the middle of June, but they may continue to make their appearance till considerably later. Diseased plants are somewhat stunted, and are conspicuous even at a distance by their pale green or yellow foliage. The upper leaves show a tendency to remain small, stiff, and erect, whilst the margins of the leaflets are generally rolled inwards.

The most characteristic feature is to be found at the base of the stem. If affected stalks are pulled up they will be noticed to come away easily and to be rotten and inky black at their bases (see illustration). In some plants all the stalks will be affected in this way, in others only one or two. The outer or cortical tissues will be soft and decayed or perhaps entirely rotted away, and if cut open the pith will be found to be blackened or destroyed. In some cases the destruction of the pith extends upwards for a considerable distance. The old " set " or " seed " potato will be completely rotted away.

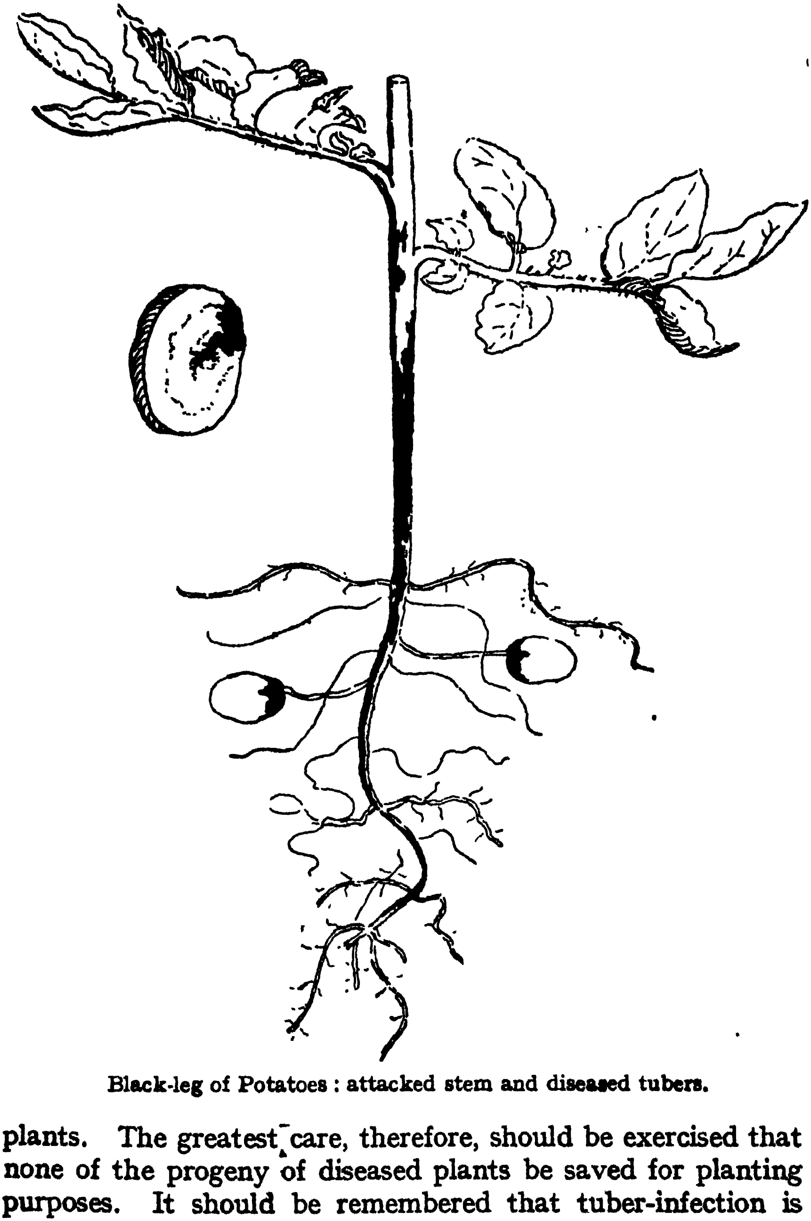
Another indication of black-leg is seen when affected stems are cut transversely. The section will show near its outer part three brown spots which are the woody portions of the principal vascular bundles. The brown colour is due to the action of the bacteria, and in bad cases it extends to the extreme apex of the shoot and sometimes manifests itself externally in the form of black streaks on the stem. If such vascular bundles are examined with the microscope, the tissues, at any rate in the most recently-affected portions, will be found to be teeming with bacteria. It will be noted also that affected stems are tougher than those which are healthy. These two features—the discoloured bundles and the tough stems—are not, however, confined to black-leg, but occur also in "leaf-roll" and in certain wilt diseases.

Later Stages of the Disease.—As the season advances the leaves of affected plants turn brown and the stalks usually die off. If the disease develops early this will take place before any new tubers are produced, but where the disease may have progressed more slowly new tubers will have been formed, and a certain number of these will be affected, the parasitic organism having passed along the rhizomes (or underground stems) and entered in at the heel-end.

Diseased tubers may be recognised by being soft and discoloured, especially at the heel-end, and by the flesh being brown and ultimately becoming wet and rotten. In bad attacks practically all the tubers decay in the ground, but in many cases the disease does not advance so rapidly, and the tubers remain sound for a time but decay badly in storage. Those tubers which are only slightly affected survive the winter and if planted give rise to diseased plants.

Decay in the store is probably also increased by infection of healthy tubers through contact with those which are diseased. The soft, wet mass formed in the rotting diseased tubers contains millions of the parasitic bacteria, and it has been proved by experiment that water containing these bacteria is capable of infecting and causing the decay of sound tubers The parasite in this case enters by way of the lenticels (or breathing pores) and probably also by means of wounds. The heavy losses which occasionally occur in the pit are perhaps largely attributable to this form of infection, especially if the pit is wet or badly ventilated.

Spread of the Disease.—It has been proved beyond all question that black-leg is propagated by the use of diseased "seed." The seed may sometimes be so slightly infected as to appear quite sound externally, yet if planted it may produce diseased plants. The greatest care, therefore, should be exercised that none of the progeny of diseased plants be saved for planting purposes. It should be remembered that tuber-infection is liable to take place, not only when plants are so badly attacked



Black-leg of Potatoes: attacked stem and diseased tubers.

that they die, but when only one or two shoots are affected and the plants as a whole continue to live.

Land which has borne a diseased crop will be certain to contain the parasitic bacteria in more or less abundance, and it is probable that such soil will be capable of producing disease in a new crop even though planted with healthy tubers. Direct infection of the young tubers from the soil has not, however, been definitely proved for this country, though it is stated to take place on the Continent. Tubers from infected land would moreover be contaminated owing to the soil adhering to them, and might be suspected of giving rise to a diseased crop or of carrying infection to new localities. In England no evidence has yet been advanced to prove that black-leg is seriously increased by this means, but, in the event of it being proved, it has been shown in America that the seed tubers may be easily disinfected with formalin.

Almost all varieties of potatoes are subject to black-leg, but it is perhaps especially common in British Queen, Great Scot, and King Edward.

Control.—1. As far as is practicable all diseased plants should be dug up and destroyed as soon as noticed, and the young tubers removed from the soil. Tubers which are sound may be used for immediate consumption. The remainder should be destroyed.

2. It is of the utmost importance to use only sound seed. Tubers which are the produce of affected plants, however sound they may appear to be, should never be saved for seed purposes. If possible, seed should be obtained only from areas where black-leg is not prevalent.

3. Care should be exercised in constructing the pits. All tubers showing any trace of disease should be excluded, and the pits made as dry and well ventilated as possible.

4. Though it has not been proved that in this country disease is contracted from the soil, infected land should not be planted with potatoes for, at the least, one year.

Notes on Feeding Stuffs for October: *From the Animal Nutrition Institute, Cambridge University.*

SUPPLIES of feeding stuffs are on the whole small. Many well-known articles have practically disappeared from the market. There is still a fair supply, however, of English linseed cake, Egyptian cotton cake, palm kernel cake, maize, and wheat offals on most markets.

Changes in price since last month have been very irregular. On the whole, there has been a slight tendency in the direction of reduced prices, but, on the other hand, several important articles (*e.g.*, wheat offals) are distinctly dearer. Feeding barley, in spite of the very small supply, fell greatly in price, no doubt in view of the large amount of damaged barley which may be expected to result from the unsettled weather during harvest.

It is difficult to discuss the prices of cakes and offals whilst Lord Rhondda's decision as to reducing their prices is still pending, and whilst there is some uncertainty as to the amount of cake which is likely to be available.

Horses.—Nothing has happened since last month to necessitate any change in the ration then suggested for horses, namely, a mixture of 4 lb. of palm kernel cake with either 5 lb. of pollards or 7 lb. of bran, which might be used to replace 10 lb. of oats. Probably, however, many farmers will prefer to use their own oats as soon as they begin thrashing.

Milking Cows.—The recent wet weather will have resulted in a large supply of grass of a lush character, which will be liable to cause scouring unless counteracted by a certain allowance of dry food. Cotton cake is the best known food for this purpose, and it may be advisable to use 2 lb. or so per head per day, although the present price of about £16 per ton works out at the very high figure of 4*s.* 6*d.* per unit.

Bran fed dry is also useful for preventing scouring, and at present prices is 1*s.* per unit cheaper than cotton cake.

For purposes other than the above, the cheapest and most plentiful foods suitable for cows are palm kernel cake and millers' offals.

It is impossible at present to discuss winter feeding until the Food Controller has stated what measure of success he has been able to achieve in reducing the prices of cakes and offals, and what arrangements he proposes for ensuring the supply of dry food for the production of winter milk.

TABLE I.

Approximate Prices per ton at the end of August.

Feeding Stuff.	Digestible Food Units.	London.		Liverpool.		Hull.		Bristol.		Glasgow.	Leith.
		Price.	Supply.	Price.	Supply.	Price.	Supply.	Price.	Supply.	Price.	Price.
		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	£ s. d.
Soya Bean Cake	122·3	—	None	—	—	—	None	—	—	—	—
Decorticated Cotton Cake	126·3	22 5 0	Very small.	21 12 6	Moderate	—	None	—	—	—	—
Decorticated Cotton Meal	126·3	—	—	—	—	—	—	—	—	—	—
American Linseed Cake	119·0	—	—	—	—	—	—	—	—	—	—
Indian Linseed Cake	123·1	—	None	21 15 0	Moderate	—	None	—	—	21 10 0	21 10 0
Russian Linseed Cake	123·5	—	—	—	—	—	—	—	—	—	—
English Linseed Cake	120·1	22 0 0	Fair	—	Limited	—	—	20 0 0	Small	—	21 15 0
Bombay Cotton Cake	65·3	—	None	16 5 0	Moderate	—	None	15 5 0	Small	—	16 5 0
Egyptian Cotton Cake	71·9	16 0 0	Fair	16 15 0	"	15 10 0	Fair	15 15 0	Small	—	16 5 0
Coconut Cake	102·6	18 0 0	"	—	—	—	None	—	—	—	—
Palm Kernel Cake	96·1	16 10 0	"	15 0 0	Fair	14 12 6	Poor	—	—	—	—
Palm Kernel Meal (extracted)	92·5	—	—	—	—	—	—	—	—	—	—
Ground-nut Cake	145·2	18 10 0	Improved	—	—	—	None	—	—	—	—
English Beans	99·5	21 9 6	Some still left.	22 12 9	Moderate	21 1 0	Poor	—	—	—	—
Bean Meal	99·5	—	—	—	—	—	—	—	—	25 0 0	—
Chinese Beans	101·1	—	—	21 14 0	Fair	—	None	—	—	—	—
English Maple Peas	97·2	24 0 0	Some still left.	—	—	29 6 8	Poor	—	—	—	—
English Dun Peas	97·2	22 17 9	"	—	—	26 13 4	"	—	—	—	—
Calcutta White Peas	97·5	—	Nominal	—	—	—	None	—	—	—	—
American Maize..	93·8	16 6 8	Fair	17 0 9	Poor	16 17 3	Fair	—	—	19 4 0	—
Argentine Maize	94·2	17 10 0	Small	19 15 9	Poor	—	None	—	—		—
Maize Meal	86·5	*22 15 0	Scarce	—	—	36 5 0	Poor	—	—	20 0 0	—
Maize Gluten Feed	121·6	19 0 0	"	17 15 0	Good	—	None	19 0 0	Fair	—	—

* No inferior offered.

TABLE I.—*continued.*

Feeding Stuff.	Digestible Food Units.	Approximate Prices per ton at the end of August.									
		London.		Liverpool.		Hull.		Bristol.		Glasgow.	Leith.
		Price.	Supply.	Price.	Supply.	Price.	Supply.	Price.	Supply	Price	Price.
		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	£ s. d.
Maize Germ Meal	99·2	19 5 0	Scarce	19 0 0	Good	—	None	18 17 6	Small	—	—
English Feeding Barley	83·0	—	None	—	—	15 8 0	Poor	—	—	—	—
English Oats	75·4	—	"	—	—	19 15 0	"	‡13 6 8	Small	—	—
Argentine Oats	75·4	22 9 6	Scarce	—	—	—	None	—	—	—	—
Malt Culms	69·9	15 0 0	Variable	—	—	13 10 0	Poor	—	—	14 10 0	15 10 0
Brewers' Grains (dried)	84·5	18 0 0	Improved	—	—	16 0 0	"	17 15 0	Fair	16 15 0	—
Brewers' Grains (wet)	21·1	2 12 6	"	—	—	2 0 0	"	—	—	—	—
Distillers' Grains (English)	101·2	19 0 0	Moderate	—	—	—	None	18 10 0	Fair	}17 0 0	16 15 0
Distillers' Grains (French)	101·2	19 0 0	Fair	—	—	—	"	—	—		
Distillers' Mixed Grains (wet)	20·0	—	—	—	—	—	—	—	—	—	—
Egyptian Rice Meal	78·7	—	Nominal	—	—	—	None	—	—	—	—
Burmese Rice Meal	78·7	—	"	—	—	—	"	—	—	—	—
Rice Bran	78·7	—	—	—	—	—	—	—	—	—	—
Wheat Middlings (coarse)	92·0	15 0 0	Scarce	—	—	14 15 0	Fair	—	—	15 10 0	15 5 0
Wheat Sharps	92·0	15 5 0	Very Scarce.	15 5 0	Limited	14 15 0	Fair	15 0 0	Fair	14 15 0	14 0 0
Wheat Pollards	87·0	—	—	14 7 6	"	—	—	—	—	—	—
Wheat Bran	77·5	13 0 0	Scarce	—	—	14 0 0	Fair	13 10 0	Good	14 2 6	13 15 0
Wheat Bran (broad)	79·9	14 0 0	"	14 10 0	Limited	15 10 0	"	14 0 0	"	14 5 0	14 14 0
Feeding Treacle	60·0	—	None	22 10 0	Moderate	—	None	—	—	—	—
Linseed	153·5	30 0 0	Fair	—	—	30 0 0	Poor	32 0 0	Small	—	¶32 10 0
Linseed Oil	250·0	58 0 0	"	†62 0 0	Limited	60 0 0	"	5s. per gal.	"	—	—
Egyptian Cotton Seed	108·6	19 0 0	" ‡	—	—	19 0 0	"	—	—	—	—
Bombay Cotton Seed	99·6	—	—	—	—	—	—	—	—	—	—
Cotton Seed Oil	250·0	60 0 0	Fair	†75 0 0	Limited	—	—	—	—	—	—
Fish Meal	145·0	—	—	—	—	—	—	—	—	17 0 0	17 0 0

† In barrels. ‡ Old crushed. ¶ Crushed.

Cattle for Beef Production.—It is extremely difficult to give definite advice on this subject under the present conditions of uncertainty as to the supply and price of feeding stuffs. The only possible line to take is to assume that the supply of feeding stuffs for beef production in the coming winter will be extremely limited, and that for the most part cattle will have to rely on little more than roots, hay, and straw, helped by a minimum of cake and possibly a small allowance of home-grown oats.

Under these conditions, young cattle will not make such progress as will fit them for slaughter in the spring. They must be wintered as cheaply as possible and fattened on the grass next summer.

In the case of older cattle, say 2½ years and over, the position is more hopeful. There is not much recent information on the production of beef by feeding on hay, straw and roots only, but the following instances, in which a minimum of cake was used, throw some light on the subject:—

In the winter of 1908–9 an investigation of the relative value of rich and poor farmyard manure was commenced at the Norfolk Agricultural Station. The 10 bullocks selected to make the poor manure were cross-bred shorthorns, about 2½ years old, weighing 10½ cwt. each, live weight. They cost £14 14s. per head, or 28*s*. per live cwt. Their ration per head per day was 150 lb. of roots, 7 lb. of oat straw chaff, and just under 1 lb. of undecorticated cotton cake, and they had a daily allowance of 24 lb. of barley straw for litter from which no doubt they picked out and ate the more nutritious parts. During 20 weeks on this ration, they increased in live weight 1¼ cwt. per head, or almost exactly 1 lb. per head per day. At the end of this period they were sold by auction and realized £20 5*s*. per head, or 34*s*. 6*d*. per live cwt.

This investigation has been repeated several times at Cambridge, again with the object of making poor farmyard manure for experimental purposes. On each occasion a ration similar to that quoted above has given a live weight increase averaging over 1 lb. per head per day. On one occasion the animals so fed were sold to a high-class local butcher, who reported that the yield of carcass obtained was 55½ per cent. of the fasted live weight, and that the quality of the meat was quite acceptable to his customers.

In support of these figures, it is recorded by McCulloch, in the Journal of the Highland and Agricultural Society for 1852–3, that six Galloway bullocks, between 2 and 3 years old, made increases of 1½ lb. per head per day on a ration of 7 lb. of oat straw and 120 to 150 lb. of roots.

These instances serve to show that it is not impossible to produce eatable beef in the winter on roots and straw, especially if helped with even so small a ration of cake as 1 lb. per head per day, at any rate in the case of cattle over two years old.

TABLE II.

LONDON. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet)	2	5¾	Distillers' grains (English)	3	9
Ground nut cake	2	6½	Distillers' grains (French)	3	9
Maize gluten feed	3	1¾	Maize germ meal	3	10½
Wheat middlings	3	3¼	Linseed	3	11
Wheat sharps	3	3¾	Brewers' grains (dried)	4	3¼
Wheat bran	3	4¼	Malt culms	4	3½
Palm nut cake	3	5¼	English beans	4	3½
American maize	3	5¾	Egyptian cotton cake	4	5½
Decorticated cotton cake	3	6	Linseed oil	4	7¾
Coconut cake	3	6	English dun peas	4	8½
Wheat bran (broad)	3	6	Cotton seed oil	4	9½
Egyptian cotton seed	3	6	English maple peas	4	11¼
English linseed cake	3	8	Maize meal	5	3
Argentine maize	3	8½	Argentine oats	5	11½

TABLE III.

LIVERPOOL. PRICES PER FOOD UNIT.

	s	d.		s.	d.
Maize gluten feed	2	11¼	Argentine maize	4	2½
Palm nut cake	3	1½	Chinese beans	4	3½
Wheat pollards	3	3½	English beans	4	6½
Wheat sharps	3	3¾	Egyptian cotton cake	4	8
Decorticated cotton cake	3	5	Linseed oil	4	11½
Indian linseed cake	3	6½	Bombay cotton cake	4	11¾
American maize	3	7½	Cotton seed oil	6	0
Wheat bran (broad)	3	7¾	Feeding treacle	7	6
Maize germ meal	3	10			

TABLE IV.

HULL. PRICES PER FOOD UNIT.

	s	d.		s.	d.
Brewers' grains (wet)	1	10¾	Wheat bran (broad)	3	10½
Palm nut cake	3	0½	Malt culms	3	10½
Wheat middlings	3	2½	Linseed	3	11
Wheat sharps	3	2½	English beans	4	2¾
English linseed cake	3	3½	Egyptian cotton cake	4	3¾
Egyptian cotton seed	3	6	Linseed oil	4	9½
American maize	3	7¼	English oats	5	2¾
Wheat bran	3	7½	English dun peas	5	6
English feeding barley	3	8¾	English maple peas	6	0¼
Brewers' grains (dried)	3	9½	Maize meal	8	4¾

TABLE V.

BRISTOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Maize gluten feed	3	1¾	Maize germ meal	3	9½
Wheat sharps	3	3	Linseed	4	2¼
English linseed cake	3	4	Brewers' grains (dried)	4	2½
Wheat bran	3	5¾	Egyptian cotton cake	4	4½
Wheat bran (broad)	3	6	Bombay cotton cake	4	8
Distillers' grains (English)	3	8	English oats (old crushed)	6	2¼

TABLE VI.

AVERAGE PRICES PER FOOD UNIT.

LONDON, LIVERPOOL, HULL AND BRISTOL.

	s.	d.		s.	d.
Brewers' grains (wet)	2	2¼	Maize germ meal	3	10
Ground nut cake	2	6½	Argentine maize	3	11½
Maize gluten feed	3	1	Linseed	4	0
Palm nut cake	3	2½	Malt culms	4	1
Wheat middlings	3	3	Brewers' grains (dried)	4	1
Wheat sharps	3	3¼	Chinese beans	4	3½
Wheat pollards	3	3½	English beans	4	4
English linseed cake	3	5	Egyptian cotton cake	4	5½
Decorticated cotton cake	3	5½	Bombay cotton cake	4	10
Wheat bran	3	5¾	Linseed oil	4	10
Coconut cake	3	6	English dun peas	5	1¼
Egyptian cotton seed	3	6	Cotton seed oil	5	4¾
Indian linseed cake	3	6½	English maple peas	5	5¾
American maize	3	6¾	English oats	5	8½
Wheat bran (broad)	3	7½	Argentine oats	5	11½
Distillers' grains (English)	3	8½	Maize meal	6	10
English feeding barley	3	8¾	Feeding treacle	7	6
Distillers' grains (French)	3	9			

TABLE VII.

GLASGOW. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	4	Wheat bran	3	7¾
Wheat sharps	3	2½	Brewers' grains (dried)	3	11¾
Distillery mixed grains (dried)	3	4½	Maize	4	1
Wheat middlings	3	4½	Malt culms	4	2
Indian linseed cake	3	6	Maize meal	4	7½
Wheat bran (broad)	3	6¾	Bean meal	5	0¼

TABLE VIII.

LEITH. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	4	English linseed cake	3	7½
Wheat sharps	3	0½	Wheat bran (broad)	3	8¼
Distiller mixed grains (dried)	3	3¾	Linseed (crushed)	4	3
Wheat middlings	3	4	Malt culms	4	5¼
Indian linseed cake	3	6	Egyptian cotton cake	4	6¼
Wheat bran	3	6½	Bombay cotton cake	4	11¾

TABLE IX.

AVERAGE PRICES PER FOOD UNIT.

GLASGOW AND LEITH.

	s.	d.		s.	d.
Fish meal	2	4	Brewers' grains (dried) ..	3	11¾
Wheat sharps	3	1½	Maize	4	1
Distillery mixed grains (dried)	3	4	Linseed (crushed) ..	4	3
Wheat middlings ..	3	4¼	Malt culms	4	3½
Indian linseed cake ..	3	6	Egyptian cotton cake ..	4	6¼
Wheat bran	3	7	Maize meal	4	7½
Wheat bran (broad) ..	3	7½	Bombay cotton cake ..	4	11¾
English linseed cake ..	3	7½	Bean meal	5	0¼

TABLE X.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Name of Feeding Stuff.	Nutritive Ratio.	Per cent. digestible.			Starch equiv. per 100 lb.	Linseed Cake equiv. per 100 lb.
		Protein.	Fat.	Carbo-hydrates and Fibre.		
Foods Rich in both Protein and Oil or Fat.						
Ground nut cake	1 : 0·8	45·2	6·3	21·1	77·5	102
Soya bean cake	1 : 1·1	34·0	6·5	21·0	66·7	88
Decort. cotton cake ..	1 : 1·2	34·0	8·5	20·0	71·0	93
Linseed cake, Indian ..	1 : 1·9	27·8	9·3	30·1	77·1	101
Linseed cake, English ..	1 : 2·0	26·7	9·3	30·1	76·0	100
Cotton cake, Egyptian ..	1 : 2·1	15·5	5·3	20·0	40·0	53
Cotton cake, Bombay ..	1 : 2·5	13·1	4·4	21·5	37·6	49
Distillers' grains (English)	1 : 2·9	18·7	10·2	29·0	57·3	75
Distillers' grains (French)						
Maize gluten feed	1 : 3·0	20·4	8·8	48·4	87·4	115
Brewers' grains, dried ..	1 : 3·5	14·1	6·6	32·7	50·3	66
Coconut cake	1 : 3·8	16·3	8·2	41·4	76·5	101
Palm kernel cake	1 : 4·5	14·1	6·1	48·9	76·7	101
Linseed	1 : 5·9	18·1	34·7	20·1	119·2	157
Bombay cotton seed ..	1 : 6·0	11·0	16·8	30·1	77·5	102
Fairly Rich in Protein, Rich in Oil.						
Maize germ meal	1 : 8·5	9·0	6·2	61·2	81·0	107
Rice meal	1 : 9·4	6·8	10·2	38·2	68·4	90
Rich in Protein, Poor in Oil.						
Fish meal	1 : 0·1	54·0	4·0	—	60·0	78
Peas, Calcutta white ..	1 : 2·1	23·3	1·1	45·9	66·9	88
Beans, English	1 : 2·6	19·3	1·2	48·2	67·0	88
Beans, Chinese	1 : 2·6	19·6	1·7	47·9	67·0	88
Peas, English maple ..	1 : 3·1	17·0	1·0	50·0	70·0	92
Palm-nut meal (extracted)	1 : 3·4	15·6	1·9	48·7	66·1	87
Brewers' grains, wet ..	1 : 3·5	3·5	1·5	8·6	12·7	17
Malt culms	1 : 3·6	11·4	1·1	38·6	38·7	51
Cereals, Rich in Starch, not Rich in Protein or Oil.						
Barley, feeding	1 : 8·0	8·0	2·1	57·8	67·9	89
Oats, English	1 : 8·0	7·2	4·0	47·4	59·7	79
Oats, Argentine	1 : 8·0	7·2	4·0	47·4	59·7	79
Maize, American	1 : 11·5	6·7	4·5	65·8	81·0	107
Maize, Argentine	1 : 11·3	6·8	4·5	65·8	83·5	110
Maize meal	1 : 13·0	5·5	3·5	63·9	77·8	102
Wheat middlings, fine ..	1 : 4·8	13·2	3·0	53·8	72·0	95
Wheat middlings, coarse or sharps	1 : 5·1	13·8	4·3	50·5	64·0	84
Wheat pollards	1 : 4·5	11·6	4·0	51·6	60·0	79
Wheat bran	1 : 4·7	11·3	3·0	45·0	49·7	65
Wheat bran, broad ..	1 : 4·7	11·3	3·0	45·4	48·1	63
Locust bean meal	1 : 22·1	4·0	0·7	69·2	71·4	94

For this purpose, the best and cheapest cake to buy is ground nut cake, because it contains more protein, in which roots and straw are deficient, than any other feeding stuff. Unfortunately, the supply is at present deficient. Decorticated cotton cake should be a good second, but that, too, is difficult to obtain. Coconut and palm kernel cakes, which are at present fairly plentiful, are, on the whole, not quite so suitable.

Sheep.—The same general principles apply as in the case of bullocks. Older sheep are much more likely to produce eatable mutton on roots and hay in the winter than are lambs. There are many cases recorded in the *Journal of the Royal Agricultural Society* between 1845 and 1850 in which sheep made increases of 1¼ to 1½ lb. per head per week on hay and roots only, but it is no doubt advisable where it can be done to supplement these foods with a small allowance of cake or home-grown oats.

It must not be imagined that the above rations will produce either beef or mutton of the quality that farmers have been accustomed to produce in former years. With the present scarcity of feeding stuffs that is impossible. It is contended, however, that hay, straw and roots, fed to older animals, with a minimum ration of cake or oats, will produce beef or mutton which is eatable, and that is all that can be expected at the present time.

It must also be recognised that the manure produced by such restricted feeding will not contain as much nitrogen as that produced when a full cake ration is used, but this deficiency can be largely remedied by a top dressing of sulphate of ammonia.

Pigs.—The recent wet weather is likely to have the result of producing considerable quantities of diseased potatoes and damaged corn. These articles may, therefore, be added to the millers' offals and palm kernel cake, mentioned last month as the cheapest and most abundant foods suitable for pigs.

Notes on Poultry Feeding.*

APART from the high price of all foodstuffs, the principal difficulty in feeding poultry at present lies in providing them with a suitable and sufficient hard corn ration, as the staple grains of the industry are now largely required for human food.

The Use of Available Hard Corn.—By an Order dated 20th April, 1917, the Food Controller prohibited the use of sound wheat, rice, and rye in any form for feeding poultry. Barley has been requisitioned for human consumption. As the

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* Food Production Leaflet No [illegible]

Government import practically all maize and reserve it for human consumption, very little is available for feeding poultry. The use of oats is not prohibited As the quantity of oats not required for human consumption is limited, as sparing a use as possible should be made of this cereal in connection with poultry.

The grains available which may be used for feeding poultry are :—

(*a*) Tail corn of all descriptions.
(*b*) Damaged corn of all descriptions.
(*c*) Screenings extracted in the milling of wheat and other cereals.

The prices of damaged grain, tailings, and dressings, harvested in the United Kingdom in 1917, have been fixed by the Grain (Prices) Order, 1917,* made by the Food Controller. There is at present no restriction on the price of tail or damaged corn of foreign origin.

Among the damaged grains of foreign origin may be mentioned "frozen" wheat, a little of which is still available, and also what is known as "torpedoed" wheat (wheat which has been salved from ships damaged by mine or torpedo and subsequently washed and kiln-dried). This wheat has usually a salt taste and musty smell, and is therefore unfit for milling, but when mixed with other grain is a suitable and a valuable food for poultry. The amount available is variable.

Large purchasers can obtain tail corn, damaged corn, and screenings at the various corn markets, but small purchasers will find it more convenient to obtain them in the form of poultry mixtures.

Every effort should be made to economise grain by using increased amounts of meals and vegetables, but it should be remembered that it is difficult to maintain poultry in health and profit on an insufficient ration of hard corn.

Quantity of Hard Corn per Head.—Before the War 2 oz. of hard corn per head per day was the generally accepted allowance for adult poultry. During the War this allowance has been successfully reduced for layers by many skilled poultry keepers, at a time, however, when sound grain was obtainable.

Having regard to the quality of the grain now available it is probable that 1½ oz. per head per day is the minimum amount of hard corn on which adult fowls can be kept successfully.

Food Stuffs for Mashes.—In the absence of sound grain it is fortunate that food stuffs suitable for use in mashes are more plentiful, more varied and of good quality. As most of these produce more human food when fed to animals than when fed to birds, their use must be limited as far as is practicable by using them in mashes with household scraps, boiled cabbage, potatoes (chats), turnip tops, kale, and roots of all kinds. If the supply of garden produce is limited, nettles and grass may be substituted, and mowings from lawns, especially if they contain clover, are very useful.

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* See p. 673.

Silage is not often used for feeding poultry, but it has been employed with excellent results, and it is worthy of the attention of large poultry keepers. Silage can be fed in place of the ordinary soft mash with some middlings added to make it crumbly.

Meals can still further be economised by feeding a plentiful supply of any kind of uncooked green food that is available.

The principal food stuffs at present obtainable for feeding in mashes are the milling offals—bran, middlings, sharps and pollards.

Oatmeal, barleymeal, pea, bean and maize meal are difficult to obtain and prohibitive in price, but fortunately *palm kernel meal* is an efficient substitute for them.

The output of palm kernel meal has increased largely as the result of the expansion of the margarine industry in this country; it is moderate in price, keeps well and has given good results as a poultry food.

Coconut cake has also been used with success.

Meat and blood meals, like all animal products, are scarce and dear, but *fish meal* is still plentiful and, all things considered, moderate in price.

Clover meal is also obtainable in fair quantities, but care should be taken to use only good samples, as it is often adulterated.

Points to be Noted.—(1) At a time like the present great care should be taken to ensure that nothing is wasted.

(2) Food given should be supplemental to that which fowls can obtain by foraging.

(3) After harvest, poultry should be given the run of the stubbles to enable them to utilise waste grain.

(4) All mashes should be fed in troughs.

(5) Grain, except where buried in the litter, should be fed in the same way.

(6) All foods should be stored in rat-and-mouse-proof bins or boxes, since these vermin cause great loss, not only consuming large quantities, but spoiling a great deal more than they eat.

(7) Sparrows, which are probably the biggest robbers of poultry food, should be kept down in numbers.

The following wet and dry mash recipes contain food stuffs which are at present available and are suitable for laying birds. Percentages of the different ingredients are by weight.

Wet Mashes.—As much wet mash should be fed as the birds will eat in 30 minutes after it is placed before them ; any then left should be taken away.

(1)	Bran	25 per cent.
	Middlings	30 ,,
	Palm kernel meal, or barley meal, or oatmeal, or maize meal	25 ,,
	Fish or meat meal	20 ,,

The meals should be mixed with an equal quantity of boiled vegetables or household scraps until a crumbly mash is produced. Clover meal may be substituted for the vegetables or household scraps. The clover meal should be scalded with boiling water, covered with a sack and allowed to stand some hours before it is mixed with the meals.

(2)	Cabbage (boiled)	25 per cent.
	Middlings	40 ,,
	Bran	25 ,,
	Fish or meat meal	10 ,,

Mix the meals with the water in which the cabbage has been cooked.

(3)	Bran	26 per cent.
	Middlings	22 ,,
	Clover meal	10 ,,
	Palm kernel meal	18 ,,
	Maize meal	10 ,,
	Fish or meat meal	14 ,,
(4)	Coconut cake	20 ,,
	Middlings	80 ,,

Scald the coconut cake with boiling water and allow it to stand some time before adding the middlings.

Dry Mashes.—Dry mashes should be fed from hoppers or special troughs. It is immaterial whether the birds have access to the dry mash all day, or only part of the day, so long as they eat about 2 oz. each per day in addition to the hard corn ration and green food.

(5)	Bran	25 per cent.
	Middlings	30 ,,
	Palm kernel meal, or maize meal, or oatmeal	25 ,,
	Fish or meat meal	20 ,,
(6)	Bran	40 ,,
	Middlings	20 ,,
	Clover meal	20 ,,
	Palm kernel meal	10 ,,
	Fish or meat meal	10 ,,

The National Egg Laying Test, 1917-18.

A TWELVE months' egg-laying test, commencing in October next, will be undertaken by the National Utility Poultry Society (formerly the Utility Poultry Club) in conjunction with the Great Eastern Railway Company, upon a farm recently acquired by the latter near Ipswich. About 800 pullets of various breeds of fowls will compete, each breed competing in separate sections of the test. Gold, silver, and bronze medals will be awarded, in each section, to the pen of five pullets producing the highest score of eggs laid throughout the twelve months. Special prizes are also offered. Two silver cups will be offered by the Great Eastern Railway Company, one for the highest scoring pen in all sections in the test, and one for the highest scoring pen from East Anglia. The National Society also award the Lamaison Challenge Trophy to the highest scoring pen in the test, and silver cups to the highest scoring pen of those entered by breeders in Scotland, Ireland and Wales respectively.

The test will be under the direction of Mr. J. N. Leigh, the feeding of the birds being conducted strictly under war conditions and in accordance with the orders and recommendations of the Board of Agriculture and Fisheries and the Food Controller.

Entries for the test close on 20th September. Full particulars may be obtained from the Secretary, National Utility Poultry Society, 3, Vincent Square, Westminster, S.W. 1.

Credit for Farmers.*

ARRANGEMENTS have now been concluded with the banks, under which credit will be given, on the recommendation of County Agricultural Executive Committees, for the purchase of any requirements necessary for the increase of food production, including seeds, artificial manures, working horses, machinery and implements, but not for the payment of wages.

Application should be made to the Secretary of the Agricultural Executive Committee for the Administrative County within which the applicant's land is situated, on a form to be obtained from the Committee.

On the approval of an application by the Committee, the applicant will be authorised to order what he requires, and to send the bill to the bank nominated to make the advance. The bank will settle the account, and treat the amount as a special overdraft, repayable under Government guarantee, taking from the applicant a promissory note in the usual form.

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* Food Production Leaflet No. 2. See also *Journal*, April, 1917, pp. 91 and 114.

Overdrafts will be charged with interest at the rate of 5 per cent. per annum, and will as a rule be granted for a period of nine months, but at the expiration of that period may be renewed for a further period.

Co-operative societies equally with individual applicants are eligible for the grant of credit under this scheme.

The addresses of the Agricultural Executive Committees for the various Counties of England and Wales, and the names of the Banks participating in the arrangements, are shown in the annexed lists.

I.—ADDRESSES OF AGRICULTURAL EXECUTIVE COMMITTEES.

County.	Address of Secretary.
Anglesey	Shire Hall, Llangefni.
Bedfordshire	3, Harpur Street, Bedford.
Berkshire	Shire Hall, Reading
Birmingham, City of	3, New Street, Birmingham.
Breconshire	The Elms, Struet, Brecon.
Bucks	45, High Street, Aylesbury.
Cambridgeshire	School of Agriculture, Cambridge.
Cardiganshire	College Street, Lampeter
Carmarthenshire	Shire Hall, Carmarthen.
Carnarvonshire	County Offices, Carnarvon.
Cheshire	County Offices, Chester.
Cornwall	County Hall, Truro.
Cumberland	14, Main Street, Cockermouth.
Denbigh	2, King Street, Wrexham.
Derbyshire	County Education Office, St. Mary's Gate, Derby.
Devon	50, Queen Street, Exeter.
Dorset	County Offices, Dorchester.
Durham	48, Old Elvet, Durham.
Essex	East Anglian Institute of Agriculture, Chelmsford.
Flint	40, High Street, Mold.
Glamorgan	13, St. Andrew's Crescent, Cardiff.
Gloucestershire	Shire Hall, Gloucester.
Hampshire	The Castle, Winchester.
Herefordshire	21, East Street, Hereford.
Hertfordshire	28, Castle Street, Hertford.
Hunts	County Council Office, Huntingdon.
Isle of Ely	County Hall, March.
Isle of Wight	8, Southsea Terrace, Portsmouth.
Kent	Sessions House, Maidstone.
Lancashire	County Offices, Preston.
Leicestershire	33, Bowling Green Street, Leicester.
Lincoln (*Holland*)	Osborne House, Spalding.
Lincoln (*Kesteven*)	18, St. Peter's Hill, Grantham.
Lincoln (*Lindsey*)	Corporation Street, Lincoln.
Merioneth	Cefntrefor Fawr, Talsarnau, Merioneth.
Middlesex	Guildhall, Westminster, S.W. 1.
Monmouthshire	24, Bridge Street, Newport, Mon.
Montgomery	Agricultural Offices, Welshpool.
Norfolk	11, Prince of Wales Road, Norwich.

County.	Address of Secretary.
Northants	County Chambers, Northampton.
Northumberland	The Moothall, Newcastle-on-Tyne.
Notts	Shire Hall, Nottingham.
Oxfordshire	County Hall, Oxford.
Pembrokeshire	8, Victoria Place, Haverfordwest.
Radnor	Agricultural Office, Builth Wells, and County Buildings, Llandrindod Wells.
Rutland	18, Catmose Street, Oakham.
Salop	Shire Hall, Shrewsbury.
Soke of Peterborough	County Council Office, Peterborough.
Somerset	68, Boulevard, Weston-super-Mare.
Staffordshire	County Buildings, Stafford.
Suffolk (*East*)	County Hall, Ipswich.
Suffolk (*West*)	Crescent House, Angel Hill, Bury St. Edmunds.
Surrey	82, Victoria Street, S.W. 1.
Sussex (*East*)	Mountfield House, Lewes.
Sussex (*West*)	County Hall, West Street, Chichester.
Warwickshire	12, Northgate Street, Warwick.
Westmorland	15, Lowther Street, Kendal
Wiltshire	County Offices, Trowbridge.
Worcestershire	3, Sansome Place, Worcester.
York (*East Riding*)	County Hall, Beverley.
York (*North Riding*)	County Hall, Northallerton.
York (*West Riding*)	County Hall, Wakefield.

II.—LIST OF BANKS.

Barclays Bank, Limited.
Beckett's Bank, Leeds.
Capital and Counties Bank, Limited
Co-operative Wholesale Society, Limited (see Note).
County and Westminster Bank, Limited.
Equitable Bank, Limited, Halifax.
Fox, Fowler and Company's Bank, Wellington, Somerset.
Bank of Liverpool, Limited.
Lloyds Bank, Limited.
London City and Midland Bank, Limited.
London Joint Stock Bank, Limited.
London and Provincial Bank, Limited.
London and South Western Bank, Limited.
Manchester and County Bank, Limited.
Manchester and Liverpool District Banking Company, Limited.
Martin's Bank, Limited.
National Provincial Bank of England, Limited.
Northamptonshire Union Bank, Limited.
Nottingham and Nottinghamshire Banking Company, Limited.
Parr's Bank, Limited.
Sheffield Banking Company, Limited.
Union of London and Smiths Bank, Limited.
Union Bank of Manchester, Limited.
Williams Deacon's Bank, Limited.

NOTE.—Advances by the Co-operative Wholesale Society's Bank will be limited to shareholding or purchasing members of Industrial and Agricultural Co-operative Societies, and will be debited to them through the Society of which they are members.

OFFICIAL NOTICES AND CIRCULARS.

Agricultural Returns for England and Wales, 1916.

THE Preliminary Statement of the Agricultural Returns for England and Wales, collected in June last, shows that above 190,000 acres of permanent grass have been brought under the plough since June, 1916, the arable area being 195,000 acres more than a year ago

The acreage under wheat is slightly greater than a year ago, a decrease of 63,000 acres in that sown

Agricultural Returns of England and Wales, 1916; Preliminary Statement for 1916, compiled from the Returns collected on the 5th June; and comparison with 1915

CROPS

DISTRIBUTION		1917	1916	INCREASE		DECREASE.	
		Acres	Acres	Acres	Per Cent	Acres.	Per Cent
TOTAL AREA (excluding WATER)		37,137,600	37,137,600	—	—	—	—
TOTAL ACREAGE under all CROPS and GRASS (a)		27,081,600	27,074,080	7,520	0 0	—	—
ARABLE LAND		11,246,040	11,051,100	194,940	1 8	—	—
PERMANENT GRASS (a)	For Hay	4,798 960	4,825,990	—	—	27,030	0 6
	Not for Hay	11,036,600	11,196,990	—	—	160,390	1 4
	TOTAL	15,835,560	16,022,980	—	—	187,420	1 2
Wheat	Autumn Sown	1,724 600	1,787,320	—	—	62,720	3 5
	Spring Sown	193 950	124 890	69,060	55 3	—	—
	TOTAL	1,918 550	1,912,210	6,340	0 3	—	
Barley		1 460 600	1,332,080	128,520	9 6	—	—
Oats		2,257,480	2,084,670	172,810	8 3	—	—
Rye		56 020	53,480	2,540	4 7	—	—
Beans		210,860	236,260	—	—	25,400	10 8
Peas		131,000	112,680	18 320	16 3	—	—
Buckwheat		4 700	3,300	1,400	42 4	—	—
Potatoes		508,190	427,950	80,240	18 8	—	—
Turnips and Swedes		972,370	938,160	34,210	3 6	—	—
Mangold		388 740	378,140	10,600	2 8	—	—
Cabbage		39,070	47,210	—	—	8,140	17 2
Kohl-Rabi		14,560	14,600	—	—	40	0 3
Rape		64,170	70,820	—	—	6,650	9 4
Vetches or Tares		78,760	89,110	—	—	10,350	11 6
Lucerne		50 210	54,170	—	—	3,960	7 3
Mustard		24,790	65,720	—	—	40,930	62 3
Brussels Sprouts		11,630	10,830	800	7 4	—	—
Cauliflower or Broccoli		9,170	8,600	570	6 6	—	—
Carrots		15,520	10,220	5,300	51 9	—	—
Onions		6,470	4,730	1,740	36 8	—	—
Celery		3,150	3,510	—	—	360	10 3
Rhubarb		6,460	6,850	—	—	390	5 7
Chicory		550	460	90	19 6	—	—
Flax		2,510	910	1,600	175 8	—	—
Hops		16,950	31,350	—	—	14,400	45 9
Small Fruit		71,940	73,230	—	—	1,290	1 8
CLOVER and ROTATION GRASSES	For Hay	1,682,100	1,762,700	—	—	80,600	4 6
	Not for Hay	817,560	827,610	—	—	10,050	1 2
	TOTAL	2 499,660	2,590,310	—	—	90,650	3 5
OTHER CROPS		66 660	67,650	—	—	990	1 5
BARE FALLOW		355,300	421,890	—	—	66,590	15 8
ORCHARDS (b) ...		259,450	251,300	8,150	3 2	—	—

(a) Excluding Mountain and Heath Land used for grazing (3,901,710 acres in 1917, as compared with 3,816,080 acres in 1916)

(b) Any Crop or Grass grown in Orchards is also returned under its proper heading.

LIVE STOCK.

KIND.	1917.	1916.	INCREASE.		DECREASE.	
	No.	No.	No.	Per Cent	No.	Per Cent.
Horses used for Agricultural purposes (including Mares for Breeding)	796,040	772,770	23,270	3·0	—	—
Unbroken Horses (including Stallions) One year and above ...	237,400	227,170	10,230	4·5	—	—
Unbroken Horses (including Stallions) Under one year .	104,360	109,810	—	—	5,450	5·0
Other Horses	235,020	249,820	—	—	14,800	5·9
TOTAL OF HORSES ..	1 372,820	1,359,570	13,250	1·0	—	—
Cows and Heifers in Milk ...	1,831,440	1,855,450	-	—	24,010	1·3
Cows in Calf but not in Milk ...	271,540	252,050	19,490	7·7	—	—
Heifers in Calf .	361,820	322,180	39,640	12·3	—	—
Other Cattle :—Two years and above	1,093,770	1,067,770	26,000	2·4	—	—
,, ,, One year & under two	1,353,320	1,374,090	—	—	20,770	1·5
,, ,, Under one year	1,315,260	1,344,240	—	—	28,980	2·2
TOTAL OF CATTLE	6,227,150	6,215,780	11,370	0·2	—	—
Ewes kept for Breeding ...	6,872,030	7,047,110	—	—	175,080	2·5
Other Sheep —One year & above	3,563,520	3,596,960	—	—	33,440	0·9
,, ,, Under one year ...	6,734,310	7,307,050	--	—	572,740	7·8
TOTAL OF SHEEP	17,169,860	17,951,120	—	—	781,260	4·4
Sows kept for Breeding	254,290	283,000	—	—	28,710	10·1
Other Pigs	1,664,250	1,884,940	—	—	220,690	11·7
TOTAL OF PIGS ...	1,918,540	2,167,940	—	—	249,400	11·5

in the autumn being rather more than counterbalanced by increased spring sowings. Barley and oats are being grown more extensively than last year, the former showing an increase of 128,500 acres, and the latter one of 173,000 acres; the area under oats is the largest recorded since 1904. Of the pulse crops, beans have been reduced by 25,000 ares, and peas increased by 18,000 acres as compared with last year. The acreage under potatoes has been increased by 80,000 acres, or nearly one-fifth, and is about 10 per cent. greater than the highest previously recorded. The area under roots has also been extended, turnips and swedes by 34,000 acres, and mangolds by nearly 11,000 acres. Green fodder crops have been grown on reduced areas. Mustard has lost the large increase recorded last year, and the area is now below that of 1915. Bare fallow was reduced by 66,500 acres. The area of clover and rotation grasses is 90,000 acres less than last year, nearly all the reduction being in that reserved for hay. The area from which meadow hay was taken also shows a reduction, and altogether the hay area is down by nearly 108,000 acres.

The number of horses on farms increased by 13,000, those used for agricultural purposes showing an increase of 23,000. There are, however, 5,000 less foals than in 1916. The total number of cattle has again been increased, and is the largest ever recorded. The number of cows in milk on the 4th June was 24,000 less than a year ago, but the total dairy herd is 35,000 larger, the number of heifers carrying their first calves having been increased by nearly 40,000, whilst there were nearly 20,000 more cows in calf but not in milk. Both calves, and cattle from one to two years old, have been reduced in numbers, while those over two years have increased. Sheep show a considerable reduction ; the number of ewes kept for breeding declining by 170,000, and lambs by 570,000. Both sows and other pigs were being kept in smaller numbers, and the total number of pigs was 250,000 less than last year.

AN Order (No. 820), dated August 14th, 1917, has been made by the Food Controller to the effect that :—

The Grain (Prices) Order, 1917.

1. No wheat, rye, oats or barley harvested in the United Kingdom in the year 1917, may be sold at prices exceeding the maximum prices applicable according to the provisions of this Order.

2. (*a*) The maximum price applicable on any transaction shall, subject as hereinafter provided, be a price at the rate specified in the following table :—

Agreed Date of Delivery of Grain Sold.	Wheat and Rye Rate per Quarter of 504 lb.		Oats Rate per Quarter of 336 lb.		Barley Rate per Quarter of 448 lb.	
	s.	*d.*	*s.*	*d.*	*s.*	*d*
Where delivery is to be made before the 1st December, 1917, the price shall not exceed	73	6	44	3	62	9
Where delivery is to be made in the month of December, 1917, or January, 1918, the price shall not exceed	74	6	45	3	62	9
When delivery is to be made in the month of February or March, 1918, the price shall not exceed ..	75	6	46	3	62	9
Where delivery is to be made in the month of April or May, 1918, the price shall not exceed	76	9	47	3	62	9
Where delivery is to be made on or after the 1st June, 1918, the price shall not exceed	77	9	48	6	62	9

(*b*) The rate per quarter applicable for delivery during any period according to the foregoing table is hereinafter called the standard rate.

3. (*a*) Where oats suitable for the manufacture of oatmeal, rolled oats or flaked oats for human consumption are bought by an oatmeal miller specifically for the purpose of such manufacture, or by a recognised dealer specifically buying for resale for such manufacture, the maximum price shall be ascertained by adding 3*s*. per quarter to the standard rate.

(*b*) Where barley is bought by a person requiring and holding a licence from the Food Controller granted for the purpose of entitling him to use barley for a manufacturing business carried on by him, or by a recognised dealer specifically buying for resale to such a person, the maximum price shall be ascertained by adding 5*s*. 3*d*. per quarter to the standard rate.

4. (*a*) In the case of wheat and rye so damaged as to be unfit for milling, and wheat and rye tailings and dressings, the maximum price shall be ascertained by deducting 7*s*. per quarter from the standard rate.

(*b*) In the case of barley so damaged as to be unfit for milling and barley tailings and dressings, the maximum price shall be ascertained by deducting 7*s*. 9*d*. per quarter from the standard rate.

(*c*) In the case of oats improperly cleaned or containing an undue quantity of soil, and oat tailings and dressings, the maximum price shall be ascertained by deducting 5*s*. per quarter from the standard rate.

5. On the occasion of the purchase of any of the grains mentioned from any person who is a recognised dealer in grain and who is not the producer of the grain sold, the following provisions shall have effect :—

(i.) Where the purchase is made by a flour miller buying for the purpose of his mill, the maximum price shall be ascertained by adding 1*s*. per quarter to the price otherwise applicable according to the foregoing provisions of this Order.

(ii.) Where a purchase is made otherwise than by a flour miller buying for the purpose of his mill, the maximum price shall be ascertained by adding 2*s*. per quarter to the price otherwise applicable according to the foregoing provisions of this Order, provided that where the total quantity of a particular kind of grain purchased by one buyer from one seller does not in any period of seven consecutive days including the day of sale exceed 15 sacks, the maximum price in respect of each quarter so purchased shall be ascertained by adding 4*s*. per quarter to the price otherwise applicable according to the foregoing provision of this Order, and where such total quantity does not in that period amount to one sack the maximum price in respect of each quarter so purchased shall be ascertained by adding 8*s*. per quarter to the price otherwise applicable according to the foregoing provisions of this Order.

6. (*a*) The maximum prices under this Order are fixed on the basis of the following terms and conditions being applicable to the transaction :—

(i.) Payment to be net cash within seven days of completion of delivery and moneys then unpaid thereafter to carry interest not exceeding the rate of 5 per cent. per annum or bank rate, whichever be the higher.

(ii.) Delivery of grain by producer to be free on rail or barge or to mill or store in accordance with the usual custom of the district.

(iii.) Freight, haulage, porterage and cartage from the point where delivery has been or is to be made by the producer to be for the buyer's account.

(iv.) All sack hire up to and including the time of delivery to rail, barge, mill or store by producer to be for the producer's account and all charges for casks subsequent thereto to be for buyer's account.

(*b*) Where the grain is sold on terms or conditions other than the terms and conditions stated in the foregoing part of this clause, a corresponding adjustment shall be made in the maximum price, and for this purpose the cost of delivery for which the producer is liable under the above terms shall be reckoned at the rate of 6*d*. per ton per mile.

7. If the buyer of any home-grown grain sold should require the grain bought to be mechanically treated, the cost of such treatment shall be the subject of a separate agreement and shall not be made a condition of the sale.

8. No person shall sell or buy or offer to sell or buy any of the grain mentioned at a price exceeding the price applicable under this Order, or in connection with a sale or disposition or proposed sale or disposition of any such grain enter or offer to enter into a fictitious or artificial transaction or make any unreasonable charge.

9. None of the foregoing provisions of this Order shall apply to any grain which is suitable for seed and which is also sold specifically for the purpose of seed, and no grain so sold shall be used for any other purpose.

10. No person shall after the 31st August, 1917, sell any wheat, rye, oats or barley whether imported or home-grown otherwise than by weight.*

11. No person shall after 31st August, 1917, torrefy or bleach any wheat, rye, oats or barley whether imported or home-grown.

12. Where any grain is sold to a flour miller such grain shall be deemed to be sold to him for the purpose of his mill until the contrary be proved.

13. For the purpose of this Order :—

"Quarter" shall mean in relation to wheat and rye a weight of 504 lb., and in relation to oats a weight of 336 lb., and in relation to barley a weight of 448 lb.

"Sack" shall mean half a quarter.

"Recognised dealer" shall mean a person who in the ordinary way of his business deals in grain for the purpose of his livelihood.

15. From and after the date of this Order the 1917 Crop (Restriction) Order, 1917†, shall cease to be in force except as regards potatoes but without prejudice to any proceedings in respect of any contravention thereof.

AN Order (No. 903), dated 29th August, 1917, has been made by the Food Controller to the effect that :—

The Meat (Maximum Prices) Order, 1917.

1. No person shall on or after 3rd September, 1917 : (*a*) Sell by way of wholesale sale any carcase of any of the kinds of dead meat specified in the First Schedule, or any hind quarter or fore quarter of imported beef or veal at a price exceeding the maximum price therein mentioned : Provided that—

(i.) In the case of Kosher meat the maximum wholesale price shall in each case be 1½*d*. per stone in excess of the price otherwise applicable under the Schedule ; and

(ii.) Where the carcase is cut by the seller into smaller portions a further charge not exceeding a charge at the rate of 1*d*. per stone may be made for such cutting ; or

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* This Restriction applies to retail as well as wholesale businesses.

† See *Journal*, August, 1917, p. 482, and this *Journal*, p. 684.

(*b*) Sell by way of wholesale sale in any area any side, quarter, joint, or cut of the kinds of dead meat so specified at a price exceeding such maximum price as the Food Controller may from time to time direct for that area.

2. The maximum price applicable under the immediately preceding clause (hereinafter called the Maximum Wholesale Price) shall in each case be the price *ex* market, warehouse, store, or other place of sale.

Nothing contained in this part of this Order shall exempt any person from any of the obligations imposed by Part II. of the Meat (Sales) Order, 1917

Part II. of the Order, dealing with maximum retail prices, is not here printed.

SCHEDULE OF MAXIMUM WHOLESALE MEAT PRICES.

	Beef and Veal. Price per stone.			Mutton and Lamb. Price per stone.		Pork. Price per stone.	
	Home-killed.	Imported.		Home-killed.	Imported.	Home-killed.	Imported.
	Carcase	Hind Qtrs	Fore Qtrs.	Carcase.	Carcase.	Carcase.	Carcase.
1917.							
Sept.	8/8	8/4	7/–	8/8	7/8	9/6	8/6
Oct.	8/4	8/–	6/8	8/8	7/8	9/6	8/6
Nov.	8/–	7/8	6/4	8/8	7/8	9/6	8/6
Dec.	8/–	7/8	6/4	8/8	7/8	9/6	8/6
1918.							
Jan	7/4	7/–	5/8	8/8	7/8	9/6	8/6

NOTE.—In ascertaining weight, the offals are to be excluded
"Stone" shall mean stone of 8 lb.

AN Order (No. 910), dated 30th August, 1917, has been made by the Food Controller to the effect that :—

The Bacon, Ham and Lard (Maximum Prices) Order, 1917.

1. No bacon, ham, or lard shall on or after the date of this Order be sold by the importer, manufacturer, or curer thereof at prices exceeding the maximum prices specified for such bacon, ham, or lard in the Schedule hereto.

2. A person shall not sell or offer for sale, or buy or offer to buy any bacon, ham, or lard at prices exceeding the maximum prices provided by clause 1 of this Order, or in connection with any sale or disposition or proposed sale or disposition of bacon, ham, or lard, enter or offer to enter into any artificial or fictitious transaction or make or demand any unreasonable charge.

3. This Order shall not apply to any sale by retail.

4. The expression "Importer" shall include any person sighting the shipper's draft, but this provision shall not be construed so as to limit the general interpretation of that expression.

SCHEDULE.

BACON.

		Per 112 lb.
Irish (Wiltshire Cut)	f.o.b.	162/-
,, Spencers (Green)	,,	162/-
,, Gammons (Green)	,,	168/-
Irish Rolled Bacon (skin on)	*ex* Factory	176/-
Irish Rolled Bacon (skin off)	*ex* Factory	190/-
North of Ireland Dried Rolls	f o.b.	184/-
English (Wiltshire Cut) (Green)	*ex* Factory	163/-
Wet Shoulder Bellies	*ex* Factory	174/-
Wet Special Sides	,,	174/-
Scotch Ayrshire Rolled Bacon	*ex* Factory	190/-
Danish	*ex* Port	162/-
Canadian—		
Wiltshire Cut	*ex* Port	157/-
Canadian Cured American	,,	154/-
Long Rib	,,	153/-
Cumberland	,,	155/-
Long Hams	,,	146/-

(If box-weight terms 1s. per cwt. less)

		Per 112 lb.
Dutch	*ex* Port	162/-
American—		
Wiltshire Cut	,,	152/-
Cumberland Cut	,,	152/-
Bellies	,,	160/-
Long Clear	,,	160/-
Short Clear Backs	,,	157/-
Short Rib	,,	157/-
Short Clear	,,	160/-
Rib Backs	,,	159/-
Long Hams	,,	137/-
A/C Hams	,,	137/-
Manchester Cut Hams	,,	137/-
Skinned Hams	,,	145/-
Fatless Hams	,,	150/-
Stafford Cut Hams	,,	142/-
Square Shoulders	,,	128/-
New York Shoulders	,,	122/-
Picnics	,,	110/-
Long Rib	,,	148/-
Dublin Cut	,,	146/-

(If box-weight terms 1s. per cwt, less.)

LARD

		Per 112 lb.
Scotch Bladders	*ex* Factory	153/-
Irish Bladders (16/30s.)	f o.b	148/-
American, Pails	*ex* Port	125/3

		Per 112 lb.
American, Boxes	*ex* Port	124/-
,, Tierces	,,	124/-
,, ,, (Prime Steam)	*ex* Port	122/-

HAMS.

		Per 112 lb.
Irish, Fresh	f o b	144/-
,, *ex* Salt	,,	154/-
,, Smoked or pale dried, short cut	f.o.b.	190/-

		Per 112 lb.
Irish, Smoked or pale dried, long cut	f o.b.	184/-
,, Boneless Smoked	*ex* Factory	194/-

All these Prices are subject to the following terms :—

Cash in seven days, less 2*d*. in the £ discount ; or cash in one month, less 1*d* in the £ discount.

AN Order (No. 911), dated 31st August, 1917, has been made by the Food Controller to the effect that :—

The Cheese (Maximum Prices) Order, 1917.

1. (*a*) On and after the 3rd September, 1917, Cheese shall not be sold by or on behalf of the maker thereof at prices exceeding the maximum prices for the time being prescribed by the Food Controller as first hand prices.

(*b*) Until further notice the first hand prices shall, for varieties of cheese mentioned in the Schedule, be prices at the rates set forth in the Schedule.

2. (*a*) On and after the 3rd September, 1917, no person (other than a maker in respect of cheese made by him) shall sell any cheese at a price in excess of whichever shall be the less of the two following prices, namely :—

(i.) A price at the rate of 6*s*. per cwt. above the price paid by him, together with the addition of all monies actually paid for transport.

(ii.) A price at the rate of 10*s*. per cwt. above the first hand price fixed by this Order, or where further or other first hand prices are fixed under this Order, the first hand price in force at the time of his purchase, with the addition in either case of all moneys actually paid for transport.

(*b*) No addition may be made on account of shrinkage.

(*c*) The amount of the moneys paid for transport shall be shown separately on the invoice.

(*d*) In any proceedings the burden of proving the amount actually paid for transport shall lie upon the person charged.

3. A person shall not sell or offer for sale or buy or offer to buy any cheese at prices exceeding the maximum prices provided by or under this Order, or in connection with any sale or disposition or proposed sale or disposition of cheese enter or offer to enter into any artificial or fictitious transaction or make any unreasonable charge.

4. Every person dealing in cheese shall keep accurate records containing such particulars as are necessary to show whether or not he is complying with the provisions of this Order so far as they relate to him or his trade, and shall make such returns as to his trade in cheese as may from time to time be required by the Food Controller. All such records and relevant documents shall be open to the inspection of any person authorised by the Food Controller.

5. This Order shall not apply to any sale or purchase by retail.

SCHEDULE OF PRICES FOR BRITISH-MADE CHEESE.

	Per cwt.		Per cwt.
Cheddar make	132/-	Partially skimmed	115/-
Cheddar loaf make	132/-	Stilton make ..	1/6 per lb
Derby and Leicester make ..	132/-		
Caerphilly make	119/-	Wensleydale Flat Shape make	129/-
Dunlop make	130/-		
Cheshire, Stafford and Lancashire make	129/-	Wensleydale Stilton Shape make	1/6 per lb

In all cases prices are *ex* factory or *ex* farm and include delivery as customary.
All these prices are subject to the following terms :—
For cash in 7 days, 2*d*. in the £ discount ; for cash in one month, 1*d* in the £ discount.

AN Order (No. 913), dated 31st August, 1917, has been made by the Food Controller to the effect that :—

The Butter (Maximum Prices) Order, 1917.

1. (*a*) On and after the 3rd September, 1917, butter shall not be sold by or on behalf of the importer or the maker thereof at a price exceeding the maximum price for the time being prescribed by the Food Controller as the first hand price.

(*b*) Until further notice the first hand price shall, for the several varieties of butter mentioned in the Schedule to this Order, be a price at the rate set forth in the Schedule as applicable thereto.

2. (*a*) On and after 3rd September, 1917, no person (other than an importer in respect of butter imported by him or a maker in respect of butter made by him) shall sell any butter at a price which exceeds by more than the permitted amount whichever shall be the less of the two following prices, namely :—

(i.) The price paid by him for such butter ; or (ii.) The first hand price fixed by this Order or where further or other first hand prices are fixed under this Order the first hand price in force at the time of his purchase.

(*b*) The permitted amount shall be a sum at the rate of 7*s*. 6*d*. per cwt., with the addition of—

(i.) All moneys, if any, actually paid for transport, after sale by the importer or maker ; and

(ii.) Necessary cold storage charges or expenses (not exceeding the rates current in the district where stored) incurred by the seller before the 3rd September, 1917.

(*c*) The amount of the moneys paid for transport or paid or charged for cold storage shall be shown separately on the invoice.

(*d*) In any proceedings the burden of proving the amount actually paid for transport shall lie upon the person charged.

3. Clauses 1 and 2 of this Order shall not apply to a retail sale.

4. (*a*) On and after 10th September, 1917, no person shall sell butter by retail at a rate per lb. exceeding by more than 2½*d*. the actual cost to him of the butter sold.

(*b*) An additional sum not exceeding ½*d*. per lb. may be charged for giving credit and for delivery otherwise than by post or rail. No additional charge may be made for packages.

The actual cost shall in the case of all butter (other than butter imported or made by the person in question) be the net price paid for such butter (not exceeding the maximum price applicable under clause 2 hereof), together with all moneys actually paid for transport not included in such price, and in the case of all butter in respect of which there is for the time being a first hand price shall be the first hand price in force at the time of sale, together with any moneys actually paid for transport in the United Kingdom.

(*d*) In any proceedings the burden of proving the actual cost of the butter sold shall lie on the person charged.

5. (*a*) A Food Control Committee may from time to time prescribe a scale of maximum prices applicable to sales of butter by retail in their area, and may from time to time revoke or vary any scale so prescribed. Any scale prescribed under the powers conferred by this clause shall be in accordance with any general directions which may from time to time be given by the Food Controller.

(*b*) Where any scale has been so prescribed then (subject to any limitations or exceptions prescribed by the Committee) no butter shall be sold by retail within the area of the Committee at prices exceeding the prices provided by the scale.

(*c*) Where the Food Controller so directs a Food Control Committee shall in exercise of the powers and duties conferred by this clause act in combination with any other Food Control Committee or Committees, and in such case the scale or scales prescribed shall apply to the areas of all such Committees.

(*d*) Compliance with the terms of a scale prescribed under the provisions of this clause shall not relieve any person from the necessity of complying with the provisions of clause 4 of this Order.

(*e*) This clause shall not apply to Ireland.

6. A person shall not sell or offer for sale or buy or offer to buy any butter at prices exceeding the maximum prices provided by or under this Order, or in connection with any sale or disposition or proposed sale

or disposition of butter enter or offer to enter into any artificial or fictitious transaction or make any unreasonable charge

7 Every person dealing in butter shall keep accurate records containing such particulars as are necessary to show whether or not he is complying with the provisions of this Order so far as they relate to him or his trade, and shall make such returns as to his trade in butter as may from time to time be required by the Food Controller or a Food Control Committee All such records and relevant documents shall be open to the inspection of any person authorised by the Food Controller or the Committee.

8 For the purposes of this Order the expression " importer " shall include the person sighting the shipper's draft, but this provision shall not be construed so as to limit the general interpretation of that expression

The expression " maker " shall include a blender of butter

The expression " retail sale " shall include any sale of a quantity not exceeding 4 lb of butter by the maker of such butter where the total quantity of butter so sold by the maker to the buyer in any one calendar week does not exceed 8 lb

The expression ' Food Control Committee " shall mean a committee appointed in pursuance of the Food Control Committees (Constitution) Order, 1917

SCHEDULE OF FIRST HAND PRICES

French Fresh Rolls . .	.. *ex* Port	24/-	per doz lb
Paris (unsalted)	,	220/-	per 112 lb
Australian		206/	,,
New Zealand	,,	208/	,
Argentine .	,	206/	,
Canadian .	,,	206/	,,
American	,,	206/	
Irish Creamery or other best			
56 lb boxes .	f o r	206/	net per 112 lb
28 lb , and casks	,,	207/	, ,,
kegs .	,,	208/	, ,,
Irish Creamery or factory			
Rolls or bricks (1 or 2 lb)	,,	25/-	net per doz lb
,, ,, (½ lb)	,,	25/3	net ,,
Prints (½ lb) .	,,	25/9	, ,,
Blended butter (English Factory) delivered—			
Rolls and bricks (1 lb)	..	25/	per doz lb
,, ,, (½ lb)	..	25/3	,,
Prints (½ lb)	..	25/9	,,

(All unsalted 3s per cwt extra)

Except where the price is stated as a net price, discount shall be allowed at 2*d* in the £ for cash within 7 days, and at 1*d* in the £ for cash within one calendar month

AN Order (No 939), dated 7th September, 1917, has been made by the Food Controller to the effect that —

The Milk (Prices) Order, 1916.

1 No person shall, directly or indirectly, sell, or offer for sale, or buy or offer to buy, any milk at prices exceeding the maximum prices provided by or in pursuance of this Order

2 Until otherwise determined, pursuant to this Order, the maximum price applicable on the occasion of a retail sale of milk shall be—

(*a*) For milk delivered within the area of a Rural District Council in England or Wales, or within a district other than a burgh in Scotland, at the rate of 2*s* per imperial gallon in the month of October, 1917, and of 2*s* 4*d* per imperial gallon thereafter, until the end of March, 1918

(*b*) For milk delivered elsewhere in England, Scotland or Wales, at the rate of 2*s* 4*d* per imperial gallon in the month of October, 1917, and 2*s* 8*d* per imperial gallon thereafter, until the end of March, 1918

(*c*) An addition may be made to the foregoing prices at the rate of 1*d* per quart for milk delivered in bottles to the consumer's premises if bottled at or before reaching the seller's premises

(*d*) The foregoing prices shall include all charges for delivery, but it shall be permissible for the Food Control Committee for any area, from time to time, subject to the provisions of this Order, to fix for all or any of the milk sold within their area and not delivered to the purchaser's premises, a rate different from the rate for the time being applicable to milk which is so delivered

3 Where milk is sold wholesale by or on behalf of the producer, the maximum price chargeable shall be as follows —

(*a*) For milk delivered during the month of October, 1917, the rate shall be 1*s* 5*d* per imperial gallon for milk delivered during the month of November, 1917, the rate shall be 1*s* 7½*d* per imperial gallon and for milk delivered thereafter until the end of March, 1918, the rate shall be 1*s* 9*d* per imperial gallon, together in each case with a sum equal to the net amount of the charges for railway transport actually incurred by the seller

(*b*) The rates applicable under sub-clause (*a*) of this clause are fixed on the basis that the milk is delivered at the seller's expense to the buyer's premises or (at the option of the seller) to the buyer's railway station, and that in the latter case all charges for transport beyond the buyer's railway station are borne by the buyer Where milk is not sold on this basis, a corresponding adjustment shall be made in the rates, and for this purpose the cost of delivery to the buyer's premises or the seller's railway station shall be reckoned a sum not less than a sum at the rate of ½d per gallon

(*c*) No additional charges may be made for the provision of churns or other vessels

4 (*a*) Where milk is sold wholesale by or on behalf of any person other than the producer, the maximum prices chargeable shall, until otherwise determined pursuant to this Order be as follows —

(i) In the case of milk other than accommodation milk, the rate shall be 1*s* 8*d* per imperial gallon for milk delivered during October, 1917, and 2*s* per imperial gallon for milk delivered thereafter, until the end of March, 1918

(ii.) In the case of accommodation milk, the rate shall be 1*s* 10*d*. per imperial gallon for milk delivered during October, 1917, and 2*s* 2*d* per imperial gallon for milk delivered thereafter, until the end of March, 1918

(iii.) The rates mentioned in sub-clauses (i) and (ii) of this clause include all charges for delivery to the buyer's railway station if the milk is carried by rail, and for delivery to the buyer's premises if not so carried. If rail-borne milk is delivered by or at the expense of the seller to the buyer's premises, the rate may be ½*d*. per imperial gallon higher than the rates so mentioned.

(iv.) The rate fixed by the foregoing sub-clauses of this clause are fixed upon the basis that the cost of providing churns or other vessels is borne by the seller; and where milk is not sold on this basis, then the rate shall be ascertained by deducting from the rate applicable under this clause the sum of ¼*d*. per gallon.

(*b*) No milk sold shall be sold wholesale by a person other than the producer of the milk sold, except upon the terms that the milk is to be delivered by or at the expense of the seller to the buyer's premises or the buyer's railway station.

(*c*) For the purpose of this clause accommodation milk shall not include—

(*a*) Milk on the occasion of the sale of any such milk by or on behalf of the person owning the stock from which such milk is produced; or

(*b*) Milk sold under a contract or arrangement for delivery over a continuous period exceeding three days; or

(*c*) Milk sold otherwise than for the purpose of meeting fluctuating demands of the buyer.

5. A Food Control Committee may, except in the case of wholesale sales by or on behalf of producers, from time to time by resolution vary the maximum price for milk delivered within their area, or any part of such area, but:

(*a*) Every such resolution shall be reported to the Food Controller within seven days, and shall not take effect (i.) in the case of a resolution reducing the maximum price until three days after it shall have been so reported or such later time as the Food Controller may direct, and (ii.) in the case of a resolution increasing a maximum price until the same has been sanctioned by the Food Controller; and

(*b*) Every resolution of a Food Control Committee under this clause shall be subject at any time to review by the Food Controller, and shall be withdrawn or varied as he may direct.

6. A person dealing in milk shall not buy, or agree to buy, or deal in any milk of which in the ordinary course of business he does not intend to take actual delivery.

7. No person shall, in connection with the sale or disposition or proposed sale or disposition of any milk, enter or offer to enter into any fictitious or artificial transaction or make or demand any unreasonable charge.

8. A Food Control Committee may, subject to the consent of the Food Controller—

(*a*) Buy milk from any person and sell milk so bought at a price estimated to cover at least the cost of purchasing and distributing such milk; and

(*b*) Make arrangements as to the distribution of milk in their area.

9. (*a*) A Food Control Committee may—

(i.) Direct any wholesale or retail dealer delivering milk in their area to deliver such milk to any consumer or class of consumers in priority to any other person in their area; and (ii.) Direct any person selling milk by retail within their area to deliver in that area only within such parts thereof as the Committee may prescribe ; and

(iii.) With the consent of the Food Controller give directions in their area for securing the purity, cleanliness and wholesomeness of milk, provided that any directions so given shall not relieve Local Authorities of their powers and duties under any existing statutory provisions in regard to milk, or relieve cow-keepers, dairymen, purveyors of milk or occupiers of milk shops from their obligations under any such provisions.

(*b*) Every person to whom any direction is given under the powers conferred by this clause shall comply with such direction.

10. A Food Control Committee shall not, without the consent of the Local Authority or Authorities by whom they were appointed, exercise the powers conferred upon them by the two immediately preceding clauses in such a manner as may involve an expense which is ultimately to be borne by such authority or authorities, provided that the validity of any direction given by a Food Control Committee under any such powers shall not be questionable on the ground that such consent has not been obtained.

11. The provisions of this Order relating to prices shall not apply to—

(*a*) Condensed Milk, Dried Milk or Milk preparations ; or
(*b*) Milk sold for consumption on the premises of the seller.

12. For the purposes of this Order—

"Food Control Committee" shall mean a committee appointed in pursuance of the Food Control Committees (Constitution) Order, 1917.

"Buyer's railway station" shall mean the railway station to which in the ordinary course of business the milk would be consigned by the seller to the buyer.

15. The Price of Milk Order, 1917, and the Price of Milk Order, No. 2, 1917, are hereby revoked as on the date when this Order comes into force, but without prejudice to any proceedings in respect of any previous contravention thereof.

16. (*a*) This Order may be cited as the Milk Order, 1917.
(*b*) This Order shall come into force on the 1st day of October, 1917.
(*c*) This Order shall extend only to Great Britain.

AN Order (No. 821), dated 15th August, 1917, has been made by the Food Controller to the effect that:—

The Barley (Restriction) Order, 1917.

1. (*a*) No person shall on or after the 1st September use any barley except for the purpose of seed or except in the process of manufacturing flour.

(*b*) This clause shall not apply to tailings or screenings or barley which has been so damaged as to be unfit for milling.

2. (*a*) No person shall on or after the 1st September use any barley flour, except in the manufacture of articles suitable for human food, or use any article containing barley flour except as human food.

(*b*) This clause shall not apply to barley flour which on the 1st September, 1917, has been so treated as to be unsuitable for the purpose of human food, or to any barley flour or any article containing barley flour which is or may become unfit for such purpose

3 No person shall damage or permit to be damaged on or after 1st September, 1917, treat or permit to be treated any barley or barley flour or any article containing barley flour so as to render the same less fit for the purpose for which under this Order it is reserved

4 Any person authorised by the Food Controller and any Local Authority empowered to enforce the provisions of this Order, may take sample of any barley or barley flour, or other article which he has reason to suspect is being used, treated or damaged in contravention of this Order

5 If any question shall arise whether any barley is so damaged as to be unfit for milling or whether any barley flour or article containing barley flour is unfit for the purpose of human food such question may be referred to and determined by any person authorised in that behalf by the Food Controller or, in England and Wales and Scotland, by a Local Authority empowered to enforce this Order as to barley or barley flour or any such article within the district of such Local Authority

6 After the 31st August, 1917, the Maize, Barley and Oats (Restriction) Order, 1917,* shall cease to be in force as far as the same relates to barley, but without prejudice to any proceedings in respect of any previous contravention thereof

The 1917 Crop (Restriction) Order, 1917.†

THE following Order (No 896) is dated 28th August, 1917 —

The Food Controller hereby authorises all persons concerned until further notice to buy, sell and deal in potatoes of the 1917 crop grown in the United Kingdom, provided that all potatoes so dealt in shall be bought and sold for delivery before the 15th September, 1917

The Hops (Restriction) Order, 1917.

AN Order (No 914), dated 31st August, 1917, has been made by the Food Controller to the effect that —

No person shall without a permit issued under the authority of the Food Controller, either on his own behalf or on the behalf of any other person, buy or sell or agree or offer to buy or sell any hops whether imported or home-grown A person shall not without a permit issued under the authority of the Food Controller make delivery of any hops contracted to be sold by him before the 4th September, 1917

Scheme for Harvesting Horse-chestnuts by School Children.

THE following Circular, dated 15th August, 1917, has been addressed by the Board of Education to Local Education Authorities and Secondary Schools, etc —

The Board of Education has been requested by the Minister of Munitions and the Food Controller to bring the following scheme to the notice of School Authorities, Governing Bodies and Teachers, and to request their assistance in giving effect to it.

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* See *Journal*, June, 1917 p 366

† See also *Journal*, August, 1917, p 482, and this *Journal*, p 675.

A considerable quantity of grain is at present being used in certain industrial processes which are essential to the prosecution of the war. In order to set this grain free for human consumption, experiments have been made to discover a substitute which could be utilised for the industrial processes concerned, and a substitute suitable in every respect has been found in the horse-chestnut. The experiments prove that for every ton of horse-chestnuts which are harvested, half a ton of grain can be saved for human consumption. The horse-chestnut, therefore, though itself totally unfit for food, can be utilised indirectly to increase the national food supply.

It is therefore urgently necessary that this year's crop of horse-chestnuts should be harvested. In present circumstances it is felt that school children could give most valuable assistance in collecting the chestnuts, and by so doing make a definite contribution to national efficiency. It is suggested, therefore, that the Governing Bodies, Managers and Teachers of Schools should organise the efforts of the children for the purpose. To effect this a small committee might be formed in connection with each school, or convenient group of schools, to undertake the organising work in connection with the scheme in the district concerned and to answer inquiries.

It is understood that in many districts the scheme has already been taken up by private individuals, and it is obviously desirable that all persons undertaking work in connection with the scheme should co-operate with one another.

One of the duties of such a committee as is suggested above would be to see that the chestnuts gathered in their district are collected in a heap in some convenient place, preferably under cover; exposure to the weather will not, however, damage the nuts, provided that the interior of the heap does not heat.

The nuts suffer no harm from lying on the ground where they fall. They may therefore be collected either from the trees or from the ground after being shed, as may be the more convenient. Before being deposited at the collecting station they should be freed from the outer green husk, the shells of the nuts being left intact. If the husks are not removed, heating of the heaps will certainly take place.

A limited number of sacks and baskets are available for the collection of the nuts, and where there is any difficulty in obtaining bags or baskets locally, application should be made to the Director of Propellant Supplies, Ministry of Munitions, 32, Old Queen Street, London, S.W. 1.

When the collection is complete the committee should inform the Director of Propellant Supplies, as above, stating the estimated quantity of the collection, and the Ministry of Munitions will arrange to remove the nuts and forward them to the factories in the course of the winter.

Further copies of this Circular can be obtained on application to the Secretary, Board of Education, Victoria and Albert Museum, Exhibition Road, South Kensington, London, S.W. 7.

IN a Memorandum, dated 4th September, 1917, and addressed by the Food Production Department of the Board to the Agricultural Executive Committees in England and Wales, the Department appeals to landowners, farmers and others to afford all reasonable facilities for the work of harvesting horse-chestnuts to proceed and not to place any unnecessary difficulties in the way of the children who may seek in this way to contribute to national efficiency.

THE following Circular Letter, dated 15th August, 1917, has been addressed by the Director of Supplies, Food Production Department, to County Agricultural Executive Committees in England and Wales :—

Scheme for the Supply of Seed Wheat of the 1917 Crop.

I am directed to refer to previous correspondence regarding supplies of seed wheat for autumn sowing,* and to inform you that arrangements are now being completed for the distribution of a limited quantity of certain varieties of the 1917 crop to farmers through the Supplies Sub-Committee of the Agricultural Executive Committee.

The varieties of seed wheat which will be available are :—" Wilhelmina," " Victor," " Little Joss," and " Browick " ; and the Department is not prepared to supply seed of any other variety.

It is considered desirable that farmers should be informed that this scheme is not intended to interfere with the ordinary interchange of seed wheat through the regular channels of trade.

The Department has purchased a limited quantity of seed of the varieties named in order to meet the requirements of those who may not be able to obtain these varieties in the ordinary way.

The stocks purchased by the Department have all been inspected in the field by a Committee appointed for the purpose, who have exercised special care in securing wheat with a high percentage of purity.

The order from the farmer should be transmitted to the Department through the Supplies Sub-Committee, and the farmer should be asked to name a second variety which he is willing to take in the event of the supply of any one variety becoming exhausted. The Supplies Sub-Committee should satisfy themselves that the applicant requires the wheat for sowing and that he is willing to pay cash before delivery on receipt of a notification from the Department of the amount due. The price charged to the farmer for the seed wheat will be 15*s*., 20*s*. and 25*s* per quarter of 480 lb. (according to the standard of purity) above the maximum price fixed for milling wheat, and will include the cost of new non-returnable sacks (valued at 2*s*. each).

Any wheat of the varieties named above which the Agricultural Executive Committee may require for planting land which they are cultivating will be supplied on receipt of a formal application giving particulars of requirements and instructions for dispatch.

All consignments of seed will be sent carriage forward, and the consignee will be advised of the date of dispatch.

Orders for seed should be transmitted on special forms provided for the purpose. A specimen form is enclosed for your guidance,† and supplies of these may be obtained on application to the Department.

I am to request you to be good enough to advise farmers in the county to place orders for seed wheat of the varieties named *as early as possible*, and these orders should be transmitted by your Committee to the Department as they are received, but in no case later than the 15th October, 1917, after which date orders cannot be accepted.

AN Order, dated 20th August, 1917, has been made by the Minister of Munitions to the effect that :—

Superphosphate Order.

1. As on and from the day following the date of this Order the maximum prices for superphosphate shall be as follows :—

(*a*) In the case of sales or purchases for delivery in railway trucks at purchaser's or consumer's siding or nearest railway station, or *ex* barge or ship at purchaser's or consumer, wharf or in the case of sales or purchases for shipment to the Channel Islands, f o b at port of shipment, the prices specified in the schedule hereto, but less a discount or deduction of 2*s* 6*d* per ton on sales of 2 tons and upwards by makers or producers to Manure Mixers, Agricultural Merchants and Dealers, and Co-operative Societies registered under the Friendly Societies' Acts

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* See *Journal*, July, 1917, pp. 468, 469. † Not here printed.

(*b*) In the case of sales or purchases for delivery at maker s or producer's works free into purchaser's or consumer's carts or wagons for conveyance direct by road to consumer's premises, the prices specified in the schedule hereto less 10*s* per ton

(*c*) In the case of sales or purchases for delivery *ex* vendor's store or shop, or *ex* warehouse, railway goods yard or public wharf, the prices specified in the schedule hereto with the addition of the following amounts according to the quantity of Superphosphate included in the sale or purchase, namely —

Quantity Sold or Purchased	*Additional Price Authorised*
4 tons and over	5*s* per ton
1 ton and over but less than 4 tons	10*s* ,,
2 cwt and over but less than 1 ton	1*s* cwt
Less than 2 cwt	2*s* ,, ,,

Provided that such additional prices shall not be charged or paid in the case of sales or purchases of more than 1 ton for delivery *ex* railway goods yard or public wharf

(*d*) In the case of sales or purchases for delivery by road at consumer s premises from vendor s store or shop, or from warehouse railway goods yard, or public wharf, the maximum prices authorised under paragraph (*c*) above, plus cost of or local rates for cartage or haulage

2 The maximum prices fixed by paragraphs (*a*) and (*b*) of clause 1 of this Order shall not apply to any sale or purchase by or from a maker or producer for delivery as mentioned in those paragraphs where the quantity of Superphosphate included in the sale or purchase is less than 2 tons and none of the provisions of clause 1 hereof shall apply to any sale of Superphosphate for export from the United Kingdom But save as aforesaid no person shall, as on and from the day following the date of this Order until further notice, effect or offer to effect any sale or purchase of Superphosphate except for delivery in accordance with the terms specified in one or other of sub-paragraphs (*a*), (*b*), (*c*) and (*d*) of clause 1 of this Order, and at a price not exceeding that prescribed by the said clause and the schedule hereto as the maximum price (having regard to quantity, quality, and date for and terms of delivery) for such sale or purchase

3 The maximum prices fixed by clause 1 of this Order are net prompt prices for Superphosphate in maker s or vendor's bags Where credit is given to the purchaser a reasonable extra charge may be made, provided that a price for net prompt cash is quoted on the invoice and does not exceed the maximum price authorised If purchaser's bags are used, a reasonable allowance shall be made

4. All persons engaged in producing, manufacturing, selling, distributing or storing Superphosphate, or in any manufacture in which the same is used, shall make such returns with regard to their businesses as shall from time to time be required by or under the authority of the Minister of Munitions

5. All the provisions of the Fertilisers and Feeding Stuffs Act, 1906, and the regulations made by the Board of Agriculture and Fisheries in pursuance of the provisions of that Act shall apply *mutatis mutandis* to this Order.

6. For the purposes of this Order Superphosphate shall mean Superphosphate of Lime manufactured from mineral phosphate, but shall not include Basic Superphosphate, Bone Superphosphate, Dissolved Bones, Bone Meal or Bone Compound, Guanos or Compound Manures.

NOTE.—All applications in reference to this Order should be addressed to the Director of Acid Supplies, Ministry of Munitions, Department of Explosives Supply, Storey's Gate, Westminster, S.W. 1, and marked "Fertilisers."

THE SCHEDULE.

Maximum prices for Superphosphate referred to in clause 1 of the above Order :—

Percentage of Tri-Basic Phosphate of Lime rendered soluble in water.							*Price per ton.*		
							£	s	d.
15	per cent.	or over but	less than	10	per cent.	..	4	12	6
16	,,	,,	,,	17	,,	..	4	15	0
17	,,	,,		18	,,	..	4	17	6
18	,,	,,	,,	19	,,	..	5	0	0
19	,,	,,	,,	20	,,	..	5	2	6
20	,,	,,	,,	21	,,	..	5	5	0
21	,,	,,	,,	22	,,	..	5	7	6
22	,,	,,	,,	23	,,	..	5	10	0
23	,,	,,	,,	24	,,	..	5	12	6
24	,,	,,	,,	25	,,	..	5	15	0
25	,,	,,	,,	26	,,	..	5	17	6
26	,,	,,	,,	27	,,	..	6	0	0
27	,,	,,	,,	28	,,	..	6	2	6
28	,,	,,	,,	29	,,	..	6	5	0
29	,,	,,	,,	30	,,	..	6	7	6
30	,,	,,	,,	31	,,	..	6	10	0
31	,,	,,	,,	32	,,	..	6	14	0
32	,,	,,	,,	33	,,	..	6	18	0
33	,,	,,	,,	34	,,	..	7	2	0
34	,,	,,	,,	35	,,	..	7	6	0
35	,,	,,	,,	36	,,	..	7	10	0
36	,,	,,	,,	37	,,	..	7	14	0
37	,,	,,	,,	38	,,	..	7	18	0
38	,,	,,	,,	39	,,	..	8	2	0
89	,,	,,	,,	40	,,	..	8	6	0
40	,,	,,	,,	41	,,	..	8	10	0
41	,,	,,	,,	42	,,	..	8	14	0
42	,,	,,	,,	43	,,	..	8	18	0
43	,,	,,	,,	44	,,	..	9	2	0
44	,,	,,	,,	45	,,	..	9	6	0

The above prices for all qualities are for orders placed for delivery during December, 1917. In the case of orders placed for delivery during other months, the above prices are in each case to be reduced or increased 1*s*. per ton per month according as the month for delivery precedes or is subsequent to December, 1917, but with a maximum increase of 5*s*. per ton, (*e.g*. the prices for October, 1917 deliveries will be 2*s*. less per ton, while the prices for May and June, 1918 deliveries will be 5*s*. more per ton than the prices set out above).

Distribution of Superphosphate.

A Notice (F.P. 112), dated 27th August, 1917, has been issued by the Food Production Department of the Board, summarising the provisions of the Superphosphate Order (printed above) and giving the following information as to the distribution of the manure:—

It is hoped that the output of superphosphate will be sufficient to meet the demand. It is, however, very desirable that orders should be placed at once. It has been arranged that makers will accept orders for delivery in any specified month up to the limit of their output in that month, in the order in which they are received. Deliveries which cannot be made in the month promised will be made as soon as possible thereafter, but at the price of the month for which they were promised. If an order is accepted for delivery as soon as possible without any month being specified the price will be according to the month in which delivery is made.

Farmers should place their orders with the maker, dealer or agent with whom they are accustomed to deal, and take delivery at the earliest possible date. In the event of any difficulty in obtaining supplies, application should be made to the Secretary, Phosphates and Potash Distribution Committee, 72, Victoria Street, London, S.W. 1.

Merchants of repute are being recognised by the Agricultural Executive Committees in England and Wales, as approved agents for the sale of fertilisers, and the names of these merchants can be obtained on application from the Food Production Department.

The Seed Potatoes (Immune Varieties) Order, 1917.

An Order (No. 935), dated 5th September, 1917, has been made by the Food Controller to the effect that:—

1. (*a*) No potatoes of the varieties "King George V.," "Great Scot," "Lochar," and "Templar," grown in Scotland or in England or Wales in the year 1917, may be sold or otherwise disposed of or moved from the premises on which they were situate on the 6th September, 1917, except under a licence issued by the Board of Agriculture and Fisheries or by the Board of Agriculture for Scotland.

(*b*) Contracts existing at the date of this Order for the sale of any such potatoes shall stand cancelled except so far as relates to potatoes which are delivered prior to the 6th September, 1917, or which may be delivered on or after that date under and in accordance with the terms of any licence that may be granted under this clause.

(*c*) The foregoing provisions of this Order shall not effect the use of any potatoes by the grower thereof in his own household or as seed for the purpose of his farm or holdings.

2. Clause 1 of this Order shall apply only to potatoes in the hands of a person who has in his hands upwards of 5 tons of potatoes of the description mentioned in clause 1 or who has under cultivation upwards of a half acre of such potatoes.

3. (*a*) Every such person as mentioned in clause 2 shall before the 15th September, 1917, make a return on the form prescribed in the Schedule,* showing the quantity in tons of potatoes of the descriptions mentioned in clause 1, in his possession on that day and the acreage which he has under potatoes of such description, and the situation of such potatoes and acreage.

(*b*) The returns shall be made as to potatoes in England and Wales to the Board of Agriculture and Fisheries, and as to potatoes in Scotland to the Board of Agriculture for Scotland.

4. This Order shall not apply in Scotland to potatoes which will pass through a riddle having a mesh of 1 in., or in England or Wales to potatoes which will pass through a riddle having a mesh of 1¼ in.

AN Order, dated 25th August, 1917, has been made by the Minister of Munitions to the effect that :—

Order Taking Possession of Flax Grown in the United Kingdom.

1. He hereby takes possession as from the date hereof of :—

(*a*) All flax of the 1917 crop grown in the United Kingdom as and when harvested.

(*b*) All flax grown in the United Kingdom at any time and not at the date hereof in the possession of a flax spinner for the purpose of his business.

(*c*) All other flax, except Russian flax, now or hereafter situated in the United Kingdom.

2. The flax, of which possession is hereby taken under paragraph 1 (*a*) and (*b*), will be divided under the directions of the Controller of Aeronautical Supplies into six grades, according to its quality, handling and cleaning, and the Minister will pay the following prices therefor :—

		s.	*d.*				
Special	grade	35	0	per stone	delivered	at the appointed	centre.
1st	„	32	6	„	„	„	„
2nd	„	30	0	„	„	„	„
3rd	„	27	6	„	„	„	„
4th	„	26	3	„	„	„	„
5th	„	25	0	„	„	„	„

Flax which is inferior in quality to that of the 5th grade hereinbefore mentioned will be paid for upon terms which will be subsequently communicated to the various owners.

3. If after this Notice and Order any person having control of any flax of which the Minister has taken possession hereunder sells, removes or secretes such flax without the consent of the Minister, he will be guilty of an offence against the Defence of the Realm Regulations.

4. No person shall, as from the date hereof, until further notice, purchase, sell, offer to purchase or sell, or, except for the purpose of carrying out a contract in writing, existing prior to the date hereof, for the purchase of such flax, enter into any transaction or negotiation in relation to the sale or purchase of any flax situated outside the United Kingdom.

5. Further directions with regard to the delivery of flax, of which possession is taken hereunder, will shortly be issued on behalf of the Minister by the Controller of Aeronautical Supplies.

6. All communications upon the subject of this Notice and Order should be for the present addressed to the Controller of Aeronautical

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* Not here printed.

Supplies, and marked Flax Supplies, Department S. (M.A.), 1, Air Board Office, Strand, London, W.C. 2.

THE following Notice, dated 1st September, has been issued by the Ministry of Food :—

Army Cattle Purchase.

The arrangements that have been made for the purchase of cattle in the United Kingdom for the feeding of the Army during the next few months have been revised in the light of a reduction in the demands of the Army, which were originally estimated at 250,000 head. The reduction in the weekly purchases will be spread over the whole area and a smaller number of stock will be taken from England, Scotland and Ireland. The purchases will be carried out in England by traders nominated by the Auctioneers' Institute, and in Scotland by a committee of auctioneers, but in Ireland the Army authorities will buy cattle through their own agents, as the Army has for some time been possessed of an organisation for the direct purchase of agricultural produce in Ireland. The buyers have been instructed to purchase cattle in a condition to yield good lean meat, beyond that of "stores" three-quarters fat, but not "prime." The purchases will be effected at market rates, which are expected to rule below the maxima fixed by the Food Controller.

THE following Notice, dated 6th September, 1917, was issued by the Board of Agriculture and Fisheries :—

Reduction of Acreage under Hops.*

Under the Defence of the Realm Act, Regulation 2 N, N, every hop-grower is required to reduce the acreage on his holding cultivated with hops to one-half of the acreage cultivated with hops on his holding in June, 1914, but he is permitted to retain hop plants on an acreage in excess of the half of his 1914 acreage if the excess acreage is properly interplanted with other crops, and the hops thereon are not picked. The picking of any hops that may be produced on this excess acreage is therefore an offence under the Regulation. The operation of the Regulation is not limited to 1917, and while the War continues hop-growers must be prepared to maintain this reduction of the acreage cultivated with hops, and possibly to reduce the aereage in 1918 to a greater extent.

An acre of hops must be taken as an imperial acre of land, and must not be calculated by the number of plants or the number of strings and poles.

Testing the Farm Women.

AT farms near Castle Bromwich and Saltley, in Warwickshire, on 5th October, a test meeting for women farm workers in the Midland counties is to be held. This gathering is the first of its kind ever arranged in this country, and it may very well prove historic. Its promoters are the Women's Branch of the Food Production Department of the Board of Agriculture, and the details are being worked out by the travelling inspectors of that body. The fixture is a definite part of the scheme recently elaborated by the Department for the training and placing of women on the land. The trial farms are within easy reach of Birmingham; and Birmingham itself, of course, is one of the most convenient of the great Midland centres. It should be clearly understood by intending visitors that this meeting is not simply one for the purpose of demonstrating what a few picked women can do. It is, in fact, a gathering for the examination in farm practice of a large number of women who have worked on farms for periods varying from three months to a year or more.

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* See also *Journal*, April, 1917, p. 113; June, 1917, p. 371, and August, 1917, p. 591.

Only those competitors who are nominated by the Agricultural Executive Committee or the Women's War Agricultural Committee of their county and can bring a farmer's certificate of efficiency will be allowed to compete. The competitors will represent the counties of Worcester, Warwick, Stafford, Shropshire, Gloucester, Derby, Leicester, Northampton, Oxford and Nottingham, and the administrative area of Birmingham. The tests will cover milking, hand and mechanical; care of stock; harnessing; driving; ploughing with horses and motor tractors; machinery repairing; thatching; threshing; hoeing and singling, pulling, cleaning and piling roots; trussing; mowing by hand; ridging and drilling, etc. The Lord Mayor of Birmingham is taking a keen interest in the scheme, and a representative committee of management has been appointed in consultation with the Agricultural Societies, Farmers' Unions and the Women's Organisation. The judges will be experienced working farmers, and in every possible way the tests will be made the means of ascertaining real proficiency in the competitor as distinct from the special preparation occasionally indulged in for so-called examinations.

It is hoped that the meeting will tend markedly to raise the esteem of women agricultural labour in the eyes of the farming class generally, as well as to raise the standard of excellence to which earnest women workers on the land would naturally aspire. As a result of the meeting, certificates will be given to those women who obtain a certain percentage of marks. Thus farmers will know that in employing the women who hold the certificates they have workers of proved efficiency. If, as seems certain, the meeting should be a great success, similar meetings will be held in other parts of the country. Full particulars can be obtained on application to the Food Production Department, 72, Victoria Street, S.W. 1, or to Miss Day, Food Production Department travelling inspector, 85, Malden Road, Worcester.

The "National Food Journal."

THE first number of the *National Food Journal*, issued by the Ministry of Food, and to appear on the second and fourth Wednesdays in each month, was published on 12th September. The new periodical can be purchased through any bookseller, or directly from H.M. Stationery Office, at 2*d*. net per copy. In a prefatory article Lord Rhondda states very clearly his views on the position of food control, the aims of the Ministry, and the absolute need for economy in the use of all foodstuffs. Other articles deal fully with the constitution and duties of the Local Food Control Committees, the Sugar Distribution Scheme, Milk Prices, the Ninepenny Loaf, the Controller's Problem, etc. There is a very useful time table showing the dates between 15th September and the end of the year on which the various Food Orders become operative, a list of official maximum wholesale and retail prices, and a number of public announcements on such subjects as supplies and rations. Several attractive recipes for preparing dishes of potatoes are also included.

The Statutory Rules and Regulations published by the Ministry of Food since 22nd August are issued in an 8-page supplement to the first number.

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad.

The *International Crop Report and Agricultural Statistics* for August, 1917, published by the International Institute of Agriculture, gives the following particulars concerning the estimated production of cereal crops : *Wheat.*—The total production this year in Spain, France, Ireland, United States, British India, and Japan is placed at 170,686,000 qr., or an increase of 0·7 per cent. as compared with 1916. *Barley.*—The estimated yield in 1917 in Spain, Ireland, and the United States is placed at 34,529,000 qr., an increase of 4·9 per cent. as compared with last year. *Oats.*—The production in Spain, Ireland, and the United States is estimated to amount to 161,337,000 qr. this year, or 16·9 per cent. above last year.

France.—According to the official report the condition of the crops on 1st August was as follows : (80 = good, 60 = fairly good, 50 = passable)—Winter wheat, 56 ; spring wheat, 64 ; rye, 62 ; maize, 69 ; winter barley, 61 ; spring barley, 69 ; winter oats, 57 ; and spring oats, 69. (*The London Grain, Seed, and Oil Reporter*, 28th August.)

Spain.—A revised official estimate gives the yield of wheat this year as being 17,630,000 qr., as compared with 18,950,000 qr. in 1916. (*The London Grain, Seed, and Oil Reporter*, 7th September.)

Canada.—The Census and Statistics Office at Ottawa reported, on the 17th August, that the preliminary estimate of the average yield per acre of autumn-sown wheat was 22 bush., as compared with 21½ bush. in 1916 ; the total production of winter wheat this year is thus estimated at 17,816,000 bush. Throughout eastern Canada the condition of the crops on 31st July was reported as excellent ; in Saskatchewan wheat was filling well ; and in Manitoba wheat and other corn crops were improving.

In later reports of the High Commissioner, dated the 23rd and 30th August, it is stated that good weather in western Canada has had a favourable effect in filling the grain, and has set at rest the anxiety felt owing to the lateness of the season. Threshing operations have been started in Alberta. There will be a considerable increase in the new land broken up this year, and the acreage under crop next season is expected to be much in excess of the area this year.

Harvesting throughout Canada was in full swing by 6th September ; in Manitoba threshing results indicated good samples, and in Alberta the crop is grading well.

United States.—The Crop Reporting Board of the Department of Agriculture, in a report issued on the 7th September, estimates that the average condition of spring wheat at the time of harvest was 71·2, as compared with 74·0, the average of the previous ten years ; oats, 90·4, against 75·8 ; and barley, 76·3, against 78·9 ; whilst the condition of maize on the 1st September was 76·[illegible], as compared with 73·2 ; and linseed 50·2, against 78·0, the decimal average.

The total production of the corn crops in the United States this year is given as follows (figures for 1916 in brackets) : Wheat, 668,000,000 bush. (639,886,000) ; maize, 3,248,000,000 bush. (2,583,241,000) ; oats, 1,533,000,000 bush. (1,251,992,000) ; barley, 204,000,000 bush.

(180,927,000); rye, 56,000,000 bush. (47,383,000); linseed, 11,000,000 bush. (15,459,000). (*London Grain, Seed, and Oil Reporter*, 8th September).

New Zealand.—This season's crop of wheat in North Island is estimated at only 151,000 bush., as compared with 483,000 bush. in 1916; and oats, 287,000 bush., against 577,000 bush. (*Broomhall's Corn Trade News*, 7th September.)

Agricultural Conditions in England and Wales on 1st September.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st September, state that August was everywhere wet and windy. The storms appear to have been most severe in the south, especially the south-west, although some progress could be made with the harvest during the middle of the month in many areas. The corn has been very generally laid throughout the country, and the use of machinery in cutting it will be much restricted. Harvesting has been more seriously hindered in the south, where the corn that has not yet been cut is generally over-ripe; while a good deal of hay has been lying out throughout the month. With fine weather, however, harvesting operations would be pushed on rapidly.

The corn harvest generally began throughout the country during August, and probably the bulk has been cut, but in most districts comparatively little has been carted. From most parts sprouting of the grain is reported. Owing largely to the high winds having shaken out a good deal of grain, particularly oats and barley, the prospective yields are not so good as a month ago, while the quality has also generally been affected. None of the corn crops are up to the average, but barley is generally the best and oats the poorest. Prospects are worst in the eastern counties. Beans are a very bad crop, but peas are better, though considerably below the average.

Potatoes are everywhere over average, especially in the eastern counties, although not quite up to the promise of a month ago. They have suffered somewhat from the wet. Disease appears to be prevalent in the south-west; but apart from that area, although it is mentioned in many other parts of the country, there is generally less than usual, and some districts are reported free from it.

Turnips and swedes are average or rather over throughout the west and south, but much under normal on the eastern side of the country from Essex to Northumberland, so that on the whole prospects are for a crop rather below average. Their disappointing appearance in the east is largely due to the difficulty of obtaining a plant earlier in the summer, and to damage by fly. In some parts of the country the rains during August have improved the crop, but in others it has been too wet for these roots. Mangolds are universally promising, and this is the only crop to show improvement during the month. All roots would now be much benefited by sunshine.

The gales have blown down much fruit all over the country. Nevertheless, the quantity of apples, pears, and plums is still large, particularly the two latter.

Hops have been a good deal blown about by the winds, and the sunless weather has been against them. Insect attacks have not been so prevalent as usual, and comparatively little washing has been required. On the whole, therefore, this crop has not very greatly deteriorated during the month, and practically an average yield is expected.

Pastures have now plenty of grass, which has grown well during the month, but it is frequently sodden and generally of poor quality. Warm weather would improve it. Partly owing to the condition of the grass, cattle have only done moderately during the month; while the bad weather has affected sheep more decidedly.

Labour is still short, but the deficiency has hardly been so acute during August as in some recent months, as, with the assistance of soldiers, women, and schoolboys, farmers have managed to keep pace with the work. Cleaning of root fields has, however, been much neglected; and with the pressure of harvest work, as soon as the fine weather permits, the deficiency is expected to be seriously felt, especially of men able to use the scythe, of whom more than usual may be wanted owing to so much of the corn being beaten down.

Summarising the returns, and expressing an average crop by 100, the appearance of the crops on 1st September indicated probable yields which may be expressed by the following percentages: Wheat, 93; barley, 97; oats, 90; beans, 80; peas, 91; potatoes, 104; turnips and swedes, 96; mangolds, 103; hops, 99.

Agricultural Labour in England and Wales during August.

THE following local summaries give further details regarding labour in the different districts of England and Wales:—

Northumberland, Durham, Cumberland, and Westmorland.—Much help is being given by soldiers, but with the corn badly laid, the supply of labour will be deficient for the harvest.

Lancashire and Cheshire.—Labour is very scarce, and the deficiency will probably be still more felt when harvesting is in full swing.

Yorkshire—In some districts the supply of labour is very deficient, but with increased help from soldiers and women the position is much improved, and in some districts the supply is equal to the demand.

Shropshire and Stafford.—Labour is scarce, but soldiers and schoolboys have eased the situation somewhat.

Derby, Nottingham, Leicester, and Rutland.—The position shows little change from the last report. The lack of skilled labour is keenly felt, but farmers are able to manage with the assistance of soldiers and women.

Lincoln and Norfolk.—Labour is generally short, but not so seriously as of late. Women and soldiers have been of much assistance.

Suffolk, Cambridge, and Huntingdon.—Labour generally is very scarce, although the light crops have somewhat counterbalanced the deficiency, and material assistance has been rendered by soldiers, women and boys.

Bedford, Northampton, and Warwick.—Labour is short, but women and soldiers are assisting farmers considerably.

Buckingham, Oxford, and Berkshire.—With the help of women and soldiers the shortage in the supply of labour is not being very much felt as a rule.

Worcester, Hereford, and Gloucester.—The supply of labour is generally short, but the deficiency has been met to some extent by the employment of soldiers and women.

Cornwall, Devon, and Somerset.—Labour is very short, and as machinery can be so little used for harvesting the scarcity will be severely felt. Where the soldiers and women are not skilled it is feared that there will be much grain lost. In some districts the scarcity is said to be not quite so acute as last year.

Dorset, Wiltshire, and Hampshire.—The supply of labour is short, but considerable help has been given by women and soldiers.

Surrey, Kent, and Sussex.—The supply of labour is deficient, but the shortage has been made up by the employment of women and children. Difficulty is experienced in obtaining labour for cutting the laid corn with the scythe.

Essex, Hertford, and Middlesex.—The position cannot be defined as acute. Civilian labour is very deficient generally, but farmers much appreciate soldier assistance, and material help has been rendered by women and boys.

North Wales.—If an immediate spell of favourable weather comes, shortage of labour for harvesting operations will be seriously felt. Women and soldiers are rendering assistance to farmers.

Mid-Wales.—Labour is scarce.

South Wales.—Labour is everywhere short, and it is anticipated that it will be difficult to obtain labourers capable of using the scythe to cut the laid corn.

Prevalence of Animal Diseases on the Continent.

The following statement shows that according to the information in the possession of the Board on 1st September, 1917, certain diseases of animals existed in the countries specified :—

Denmark (month of June).—Anthrax, Swine Erysipelas, Swine Fever.

France (for the period 22nd July—4th August).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders and Farcy, Rabies, Swine Erysipelas, Swine Fever.

Holland (month of July).—Anthrax, Foot-rot, Glanders, Swine Erysipelas.

Italy (for the period 30th July—5th August).—Anthrax, Black-leg, Foot-and-Mouth Disease (676 outbreaks), Glanders and Farcy, Rabies, Sheep-scab, Swine Fever.

Norway (month of June).—Anthrax, Black-leg.

Russia (month of January).—Anthrax, Cattle-plague, Foot-and-Mouth Disease (12,393 animals), Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine-fever, Swine Erysipelas.

Spain (month of April).—Anthrax, Black-leg, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Tuberculosis.

Sweden (*month of July*).—Anthrax, Black-leg, Swine Fever.

Switzerland (*for the period 6th—12th August*).—Anthrax, Black-leg, Swine Fever.

No further returns have been received in respect of the following countries: Austria, Belgium, Bulgaria, Germany, Hungary, Montenegro, Rumania, Serbia.

The Weather in England during August.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 4th Aug.:								
England, N.E. ..	57·3	−1·9	1·23	31	+18	5	1·8	−4·1
England, E.	58·8	−2·1	3·31	84	+74	7	1·0	−5·7
Midland Counties ...	57·9	−2·1	1·19	30	+17	5	0·8	−5·1
England, S.E. ..	58·6	−2·6	3·52	89	+79	7	0·4	−6·6
England, N.W. ...	58·8	−0·3	0·19	5	−15	3	4·2	−1·6
England, S.W. ...	58·8	−1·0	0·74	19	+ 2	3	6·3	−0·1
English Channel ...	59·7	−1·9	0·86	22	+10	4	4·2	−4·2
Week ending 11th Aug.:								
England, N.E. ...	61·3	+2·7	1·39	35	+21	5	4·5	−1·0
England, E.	62·2	+1·6	0·56	14	+ 2	4	5·2	−1·0
Midland Counties ...	61·8	+2·1	1·48	38	+25	5	4·4	−1·2
England, S.E. ...	61·8	+0·3	0·60	15	+ 5	4	5·5	−1·1
England, N.W. ..	60·9	+2·1	0·90	23	+ 4	4	4·3	−1·1
England, S.W. ...	60·8	+0·7	1·51	38	+22	5	5·6	−0·6
English Channel ...	61·5	−0·5	0·97	25	+11	4	6·6	−1·4
Week ending 18th Aug.:								
England, N.E. ...	59·0	+2·3	1·23	31	+16	6	4·9	−0·3
England, E.	62·0	+1·8	0·41	10	− 2	4	6·6	+0·3
Midland Counties ...	60·9	+1·6	0·97	25	+11	6	5·2	−0·3
England, S.E. ...	61·8	+0·7	0·48	12	− 5	5	7·4	+0·6
England, N.W. ..	59·7	+1·2	2·17	55	+36	6	4·1	−1·2
England, S.W. ...	60·2	+0·7	0·97	25	+ 7	6	5·6	−0·8
English Channel ...	61·5	−0·3	0·88	22	+ 8	6	8·0	+0·3
Week ending 25th Aug.:								
England, N.E. ...	59·7	+2·0	0·35	9	− 8	5	6·1	+1·2
England, E.	61·2	+1·4	0·22	6	− 8	4	7·7	+2·1
Midland Counties ...	59·5	+0·9	0·51	13	− 4	5	6·1	+0·9
England, S.E. ...	60·9	+0·5	0·35	9	− 6	4	8·0	+1·8
England, N.W. ...	59·0	+0·9	1·07	27	+ 3	6	5·1	+0·1
England, S.W. ...	58·8	−0·3	1·44	37	+15	6	4·5	−1·4
English Channel ...	60·9	−0·3	0·69	18	+ 2	4	8·8	−1·6

* 1 inch = 2·54 millimetres.

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(*From the Returns of the Board of Agriculture and Fisheries.*)

DISEASE.	AUGUST.		EIGHT MONTHS ENDED AUGUST.	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	11	21	322	366
Animals attacked	13	29	370	435
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	1
Animals attacked .. .	—	—	—	24
Glanders (including Farcy):				
Outbreaks...	2	3	18	35
Animals attacked	4	6	32	90
Parasitic Mange:—				
Outbreaks	116	89	1,850	1,679
Animals attacked	197	148	3,609	3,789
Sheep-Scab:—				
Outbreaks	4	4	395	182
Swine Fever:—				
Outbreaks	112	263	1,687	3,233
Swine slaughtered as diseased or exposed to infection	52	204	732	8,589

IRELAND.

(*From the Returns of the Department of Agriculture and Technical Instruction for Ireland.*)

DISEASE.	AUGUST.		EIGHT MONTHS ENDED AUGUST	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	—	—	3	3
Animals attacked	—	—	5	7
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	–
Parasitic Mange:—				
Outbreaks	5	4	37	47
Sheep-Scab:—				
Outbreaks	22	25	261	273
Swine Fever:—				
Outbreaks	18	25	174	219
Swine slaughtered as diseased or exposed to infection	63	118	1,043	1,233

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in August and July, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	August.		July.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK :—	per stone.*	per stone.*	per stone.*	per stone *
Cattle :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Polled Scots	18 3	17 8	19 7	18 3
Herefords	17 8	16 2	18 11	17 4
Shorthorns	18 0	16 5	19 1	17 5
Devons	18 0	16 5	18 9	17 4
Welsh Runts	—	16 7	—	16 9
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	16	14	17	15
Sheep :—				
Downs	16¾	15¼	17½	16¼
Longwools	15½	14¼	16¼	15
Cheviots	16¾	15½	18	16½
Blackfaced	16¼	14½	17	15¾
Welsh	14½	13¾	16½	15
Cross-breds	16¾	15	17¼	15¾
	per stone.*	per stone.*	per stone.*	per stone.*
Pigs :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Bacon Pigs	17 4	16 5	16 9	15 9
Porkers	17 7	16 9	17 3	16 4
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	*£ s.*	*£ s.*	*£ s.*	*£ s.*
Shorthorns—In Milk ...	44 9	34 12	44 0	34 17
,, —Calvers ...	42 5	33 12	40 19	33 5
Other Breeds—In Milk ...	44 11	34 1	40 17	33 11
,, —Calvers ...	—	—	30 0	27 0
Calves for Rearing	3 19	2 19	4 4	3 5
Store Cattle :—				
Shorthorns—Yearlings ...	15 18	13 3	16 15	14 9
,, —Two-year-olds...	24 12	19 19	26 14	22 2
,, —Three-year-olds	—	24 12	35 5	31 9
Herefords —Two-year-olds...	27 14	22 16	27 10	25 0
Devons— ,,	26 12	22 14	26 17	22 18
Welsh Runts— ,,	—	—	26 7	21 7
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Downs or Longwools ...	58 9	48 10	63 0	50 0
Store Pigs :—				
8 to 12 weeks old	34 5	25 1	35 8	26 6
12 to 16 ,, ,, ...	57 7	45 0	57 3	46 3

* Estimated carcass weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in August, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.		Leeds.		Liverpool.		London.		Manchester.	
		per cwt.		per cwt.		per cwt.		per cwt.		per cwt.	
		s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
BEEF :—											
English	1st	128	0	125	0	—		128	0	121	0
	2nd	119	6	118	6	—		118	6	115	0
Cow and Bull	1st	110	0	117	0	110	0	105	6	105	6
	2nd	101	0	111	0	87	0	96	0	98	0
Irish: Port Killed	1st	—		—		126	6	123	0	116	6
	2nd	—		107	6	113	0	114	0	110	0
Argentine Frozen—											
Hind Quarters	1st	127	0	—		—		—		—	
Fore ,,	1st	99	6	—		—		—		—	
Argentine Chilled—											
Hind Quarters	1st	136	0	121	6	129	0	132	0	129	0
Fore ,,	1st	107	6	95	6	104	0	102	6	104	0
American Chilled—											
Hind Quarters	1st	128	6	133	0	121	6	136	0	121	6
Fore ,,	1st	98	0	100	6	98	0	103	0	98	0
VEAL :—											
British	1st	121	6	130	6	114	0	136	6	115	0
	2nd	110	0	121	6	93	6	117	6	93	6
Foreign	1st	—		—		—		—		—	
MUTTON :—											
Scotch	1st	135	6	142	0	—		144	6	133	6
	2nd	123	0	132	6	—		135	6	127	0
English	1st	139	0	141	0	—		140	0	126	0
	2nd	130	6	129	6	—		130	6	121	6
Irish: Port Killed	1st	133	6	—		128	0	135	6	125	0
	2nd	125	0	—		114	0	126	0	115	6
Argentine Frozen	1st	95	6	95	6	95	6	93	6	95	6
New Zealand ,,	1st	86	6	—		87	6	87	6	87	6
Australian ,,	1st	—		—		—		—		—	
LAMB :—											
British	1st	139	0	143	6	139	0	150	6	141	0
	2nd	134	0	134	6	116	6	141	0	134	6
New Zealand	1st	100	6	100	6	98	6	98	0	98	6
Australian	1st	100	6	100	6	98	0	98	0	98	0
Argentine	1st	105	0	105	0	105	0	102	6	105	0
PORK :—											
British	1st	140	0	136	6	140	0	139	0	140	0
	2nd	134	6	121	6	128	0	129	6	121	6
Frozen	1st	109	0	108	0	116	6	118	0	106	0

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in August, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	24 0	23 0
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	213 0	210 0	214 0	211 6	216 0	212 0
„ Factory	195 0	189 6	197 6	192 6	201 0	194 0
Danish...		—	—	—	—	—
French...	—	—	—	—	217 0	210 6
Dutch	—	—	—	—	204 0	196 0
Australian	206 6	203 0	—	—	209 6	205 6
New Zealand	206 6	203 6	—	—	210 0	206 0
Argentine	—	—	—	—	205 6	202 0
CHEESE ;—						
British—						
Cheddar	138 0	—	—	—	140 0	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	145 6	142 6	146 0	—
			per cwt.	per cwt.	per cwt.	per cwt.
Canadian	130 6	—	130 6	—	130 6	—
BACON ;—						
Irish (Green)	159 0	157 0	—	—	160 0	158 0
Canadian (Green sides)	—	—	150 0	145 0	151 6	150 0
HAMS :—						
York (Dried or Smoked)	—	—	—	—	188 0	180 0
Irish (Dried or Smoked)	—	—	—	—	173 6	167 6
American (Green) (long cut)	135 0	133 0	136 0	134 6	136 6	134 0
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British...	—	—	—	—	27 1	24 9
Irish	24 11	—	24 7	23 2	25 0	24 0
Danish	—	—	—	—	25 2	23 2
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Duke of York... ...	146 6	126 6	—	—	136 6	123 6
White Kidney ...	128 6	108 6	163 6	140 0	130 0	113 6
Other First Earlies ...	151 6	108 6	138 6	118 6	121 6	106 6
HAY :—						
Clover...	—	—	150 0	136 0	141 0	132 0
Meadow	—	—	—	—	141 0	132 0

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1915, 1916 and 1917.

Weeks ended (in 1917).	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 6 ...	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
,, 13 ...	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
,, 20 ...	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
,, 27 ...	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb. 3 ...	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
,, 10 ...	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
,, 17 ...	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
,, 24 ...	56	0	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar. 3 ...	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
,, 10 ..	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
,, 17 ...	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
,, 24 ...	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
,, 31 ...	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl. 7 ...	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
,, 14 ...	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
,, 21 ...	56	5	55	3	84	10	31	5	52	10	70	6	30	11	31	8	59	8
,, 28 ...	58	3	56	3	81	1	32	7	53	5	69	5	31	5	32	4	58	6
May 5 ..	60	5	55	7	77	7	33	3	53	1	64	4	32	4	32	10	54	9
,, 12 ...	61	7	55	5	78	0	34	0	53	5	64	11	32	5	33	1	55	2
,, 19 ...	62	0	55	0	77	11	34	1	52	10	64	10	32	8	33	0	55	2
,, 26 ...	61	11	54	7	78	0	34	8	52	9	64	9	32	7	33	4	54	11
June 2 ...	61	9	53	3	78	0	35	4	53	9	65	11	32	5	33	3	54	11
,, 9 ...	60	1	51	2	78	0	34	5	52	8	67	7	32	4	32	7	55	0
,, 16 ...	56	1	48	10	78	2	34	3	50	9	75	6	31	9	32	1	55	1
,, 23 ...	52	0	47	6	78	1	34	4	49	10	75	0	31	9	31	3	55	2
,, 30 ...	49	5	46	3	78	3	35	3	49	1	73	11	31	1	30	10	55	1
July 7 ...	50	1	46	3	78	1	34	7	45	6	69	5	31	6	30	8	55	2
,, 14 ...	52	7	48	11	78	2	35	8	47	5	70	10	31	6	31	6	55	1
,, 21 ...	53	10	51	6	78	3	35	10	48	8	72	1	32	1	32	3	55	2
,, 28 ...	55	3	53	5	78	3	36	1	47	2	65	7	31	1	32	5	55	2
Aug 4 ...	55	4	55	1	78	2	35	7	46	1	73	6	31	5	32	9	55	0
,, 11 ...	55	2	56	7	78	4	37	0	46	11	76	1	31	7	31	2	55	0
,, 18 ...	54	3	58	1	78	7	39	4	48	0	68	11	31	4	30	8	55	6
,, 25 ...	51	11	59	0	76	7	38	3	47	1	70	7	30	0	31	6	54	7
Sept 1 ...	45	3	59	4	72	1	38	1	48	5	60	4	26	10	30	5	49	0
,, 8 ...	43	0	59	3	71	6	37	11	51	7	59	3	26	8	31	1	46	7
,, 15 ...	42	9	59	11			39	0	52	6			26	4	30	9		
,, 22 ...	43	3	59	4			39	8	53	3			26	1	30	9		
,, 29 ...	43	5	58	10			40	4	54	1			26	5	31	1		
Oct. 6 ...	44	1	59	2			41	0	54	5			26	5	30	9		
,, 13 ...	45	9	59	7			42	3	53	10			27	1	31	6		
,, 20 ...	48	2	60	9			44	0	53	8			28	1	31	11		
,, 27 ..	50	3	62	10			46	2	54	6			29	1	32	10		
Nov. 3 ...	51	6	66	7			47	3	56	2			30	4	34	0		
,, 10 ...	52	8	69	8			47	5	58	0			30	11	35	8		
,, 17 ...	53	6	70	9			47	11	59	8			31	3	37	8		
,, 24 ...	54	2	70	8			48	7	61	8			31	1	39	7		
Dec. 1 ...	53	7	71	3			48	11	63	1			30	11	41	4		
,, 8 ...	52	10	72	1			47	10	65	6			30	4	44	1		
,, 15 ...	53	11	73	2			47	5	66	5			30	6	45	10		
,, 22 ...	53	10	74	8			47	2	67	3			30	7	46	5		
,, 29 ...	54	9	75	10			47	5	67	5			30	10	47	4		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of August, 1915, 1916, and 1917.

—	WHEAT.			BARLEY.			OATS.		
	1915.	1916.	1917.	1915.	1916.	1917.	1915.	1916.	1917.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
London ...	54 0	58 5	78 2	40 11	49 2	64 1	31 11	32 6	55 7
Norwich ...	54 4	56 0	77 11	—	44 7	64 9	29 0	32 0	54 9
Peterborough	52 4	57 0	77 11	37 7	43 4	65 11	31 0	31 0	55 3
Lincoln ..	53 11	58 7	78 0	36 7	—	—	32 4	33 5	—
Doncaster ...	53 7	57 0	78 0	35 9	—	—	31 10	32 10	54 11
Salisbury ...	54 11	57 8	78 1	36 11	46 3	72 4	30 11	31 0	55 0

SELECTED CONTENTS OF PERIODICALS.

Agriculture, General and Miscellaneous—

In-Breeding, *A. B. Bruce.* (Jour. Genetics, April, 1917.) [575 1.]

Influence of Crop, Season, and Water on the Bacterial Activities of the Soil, *J. E. Greaves, et al.* (Jour. Agric. Research, 28th May, 1917.) [63.115.]

The Solubility of Calcium Phosphates in Citric Acid, *A. A. Ramsay* [63.1672.] The Fixation of Nitrogen in Fæces, *E. H. Richards.* [63.163.] The Shrinkage of Soils, *H A. Tempany.* [63.113.] Studies on the Palæozoic Soils of North Wales, *G. W. Robinson.* [63.111.] The Influence of Soil Conditions on the Decomposition of Organic Matter in the Soil, *E. J. Russell* and *A. Appleyard.* (Jour. Agric. Sci., June, 1917.) [63.113]

On Making and Storing Farmyard Manure, *E. J. Russell.* (Jour. Roy. Agric. Soc., 1916.) [63 163]

Some Conditions Affecting the Value of Calcium Cyanamide as a Manure, *T. D. Mosscrop.* (Jour. Agric. Sci., March, 1917.) [63.1671.]

A Review of Investigations in Soil Protozoa and Soil Sterilisation, *N. Kopeloff* and *D. A. Coleman.* (Soil Science, March, 1917) [63.115.]

Relation of the Water-retaining Capacity of a Soil to its Hygroscopic Co-efficient, *F. J. Alway* and *G. R. McDole.* (Jour. Agric. Research, 9th April, 1917.) [63.113.]

Artificial Fertilisers: Their Present Use and Future Prospects, *E. J Russell.* (Jour. Soc. Chem. Industry, 15th March, 1917.) [63.162.]

Bacteriological Studies of a Soil subjected to Different Systems of Cropping for 25 years, *P. L. Gainey* and *W. M. Gibbs.* (Jour. Agric Research, 11th September, 1916.) [63 115.]

Influence of Barnyard Manure and Water upon the Bacterial Activities of the Soil, *J E. Greaves* and *E. G. Carter.* (Jour. Agric. Research, 4th September, 1916) [63.163]

Soil Fungi and their Activities, *S. A. Waksman.* (Soil Science, Vol. II., No. 2, August, 1916) [63.115]

Influence of Calcium and Magnesia in Compounds on Plant Growth, *F. A. Wyatt.* (Jour. Agric. Research, 17th July, 1916.) [63.15; 63.161.]

Field Crops—

Uber die chilenische Reismelde (*Chenopodium Quinoa,* L.) eine neue Getreide- und Wildfutter-pflanze, *A. Krausse.* (Zeit. Forst. u. Jagd, März, 1917.) [63.511.]

Some Minor Farm Crops, IV. Maize as a Fodder Crop, *K. J. J. Mackenzie.* (Jour. Roy. Agric. Soc., 1916.) [63.33(*d*); 63.315.]

West Country Grasslands, *W. E. Brenchley.* (Jour. Bath and West and S. C. Soc., 1916–1917.) [63.33(*a*).]

Der Anbau der Brennessel (*Urtica Dioica*), *Dr. O. Richter.* (Natur. Zeit. Forst u. Land., Januar, 1917.) [63.341.]

Minor Agricultural Industries, IV., Culinary Herbs, *W. Dallimore.* (Roy. Bot. Gard. Kew, Bull., No. 8, 1916.) [63.511.]

Effect of Climatic Factors on the Hydrocyanic Acid Content of Sorghum, *J. J. Willaman* and *R. M. West.* (Jour. Agric. Research, 15th May, 1916.) [63.319.]

Horticulture—

Sources of Supply of Hazel-Nuts. (Bull. Imp. Inst., Vol. XIV., No 2, April–June, 1916.) [63.41(*d*).]

Piping System for Orchard Spraying, *G. P. Weldon.* (Monthly Bull. California State Comm. Hort., August, 1916.) [63.294.)

Plant Diseases—

The Practical Use of the Insect Enemies of Injurious Insects, *L. O. Howard* (Year-book, U.S. Dept. Agric., 1916.) [63.296.]

Effects of Nicotine as an Insecticide, *N. E. McIndoo.* (Jour. Agric. Research, 16th October, 1916.) [63.295.]

Die Getreide blumenfliege (*Hylemyia coarctata* Fall.) Ein Beitrag zur Kenntnis ihrer Biologie und ihrer Bedeutung für die Landwirtschaft, *R Kleine.* (Zeit. für angew. Entomologie, Bd. II., 1915.) [63.27.]

The Disease of Potatoes known as "Leak" [caused by *Pythium debaryanum*], *L. A. Hawkins.* (Jour. Agric. Research, 24th July, 1916.) [63.24.]

Studies in the Physiology of Parasitism, II. Infection by *Botrycis cinerea*, *V. H. Blackman* and *E. J. Welsford.* III., On the Relation between the "Infection Drop" and the Underlying Host Tissue, *W. Brown.* (Ann. Botany, July, 1916.) [63.24(04).]

Live Stock—

The Dietetic Value of Wheat Bran, *R. G. Linton.* (Vet. Jour., June, 1917.) [63 604(*a*).]

Some Maize By-Products, *R. G Linton.* (Vet. Jour , Aug , 1917.) [63.604(*a*).]

Physiological Effect on Growth and Reproduction of Rations Balanced from Restricted Sources, *E. B. Hart, et al.* (Jour. Agric. Research, 23rd July, 1917.) [612.394.]

Welsh Black Cattle, *Prof. C. Bryner Jones.* (Jour. Roy. Agric. Soc., 1916.) [63.62.]

Palm Kernel Cake and Meal, *C. Crowther.* (Jour. Roy. Agric. Soc., 1916.) [63.604.]

Some Practical Questions Relating to the Pig Industry, *James Long.* (Jour. Bath and West and S. C. Soc., 1916–17.) [63.64(04).]

Dairying and Food, General—

Studies in Milk Secretion. I. The Effect of Nutrition on Yield and Composition. II. The Relation of the Glands, *J. Hammond* and *J. C. Hawk.* (Jour. Agric. Sci., March, 1917.) [63.711(*a*).]

Birds, Poultry, and Bees—

Studies on the Physiology of Reproduction in the Domestic Fowl.—XV. Dwarf Eggs, *R. Pearl* and *M. R. Curtis.* (Jour. Agric. Research, 18th September., 1916) [63.651(04).]

Die Ausbildung des Geschlechtes bei der Honigbiene. I. Die postembryonale Entwicklung des Geschlectapparates, *E. Zander.* (Zeit. für angew. Entomologie, Bd. III. Heft 1, März, 1916.) [63.81(04).]

Forestry—

Anleitung zur Gewinnung der Buchmast des Jahres, 1916, *von Oertzen*. (Natur. Zeit. für Forst-und Landwirtschaft, Heft 7 & 8, 1916.) [63.49·197.]

Economics—

Agricultural Production, *A. W. Ashby.* (Edinburgh Rev., April, 1917.) [338.1.]

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STATE ACTION FOR THE ERADICATION OF WEEDS AND THE PROVISION OF PURE SEEDS.

THE following is a brief account of the more general measures taken by the Governments of British Dominions and of foreign countries with the object of eradicating weeds and providing pure seeds. So far as can be ascertained the measures quoted are still in force.

Importation of Weed Seeds Prevented.—Many countries have made regulations in order to prevent the importation of weed seeds amongst imported seeds.

In *Australia* these regulations prohibit absolutely or conditionally the introduction of 82 species of weeds.

In the *United States* the importation of certain adulterated grain and seeds unfit for seeding purposes is prohibited (*e.g.* yellow trefoil in red clover). The maximum content of dodder allowed is 1 seed to 5 grams of clover or lucerne seed. The seed of a large number of plants is considered unfit for seeding purposes if it contains more than 3 per cent. by weight of weed seeds.

In *British Columbia* the importation of weed seeds is prohibited under penalty.

Several countries concentrate their attention on dodder. Thus in *Rumania*, lucerne, clovers, kidney vetch, bird's-foot trefoil, and timothy must not contain a *single seed* of dodder; in *France* and *Algeria* the importation of seeds of forage plants which on examination are found to contain dodder is prohibited; in *Argentina* lucerne and forage plant seeds containing more than a certain proportion of dodder cannot be imported, and the importation of *Medicago denticulata*, *M. maculata* or *M. lupulina* is prohibited.

Restrictions on the Internal Sale of Seeds.—Government restrictions have taken various forms, *i.e.* prescribing the colouring of imported seeds sold in the country, to enable buyers to distinguish home-grown seed; insisting on the plain marking of seed bags and packages with the kinds and percentages of weed seeds present in the sample; the enactment of penalties for the sale of seeds containing more than certain specified percentages of weeds, and the conferring of powers for entering premises and taking samples.

In *England* the Adulteration of Seeds Acts, 1869 and 1870, make provisions to prevent the killing and dyeing of seeds.

One of the most recent and typical laws is the *Canadian* Seed Control Act of 1911. The Governor in Council is empowered to regulate the maximum proportion of weed seeds that may be tolerated in other seeds. Inspectors are given the power of entry into seed houses and retail stores to examine seeds and take samples. Various farm seeds specified in the Act are to be free from the seeds of noxious weeds, unless the packages are marked with the names of the weeds contained. Timothy, red clover, alsike and lucerne seeds are to have the quality (3 grades are specified) marked on the packages, and there are regulations as to the maximum content of various "noxious" and other weed seeds for each grade, and no lower quality than No. 3 grade is allowed to be sold Purchasers of seeds may send samples to the official analyst, whose certificate is accepted as evidence in cases of prosecution.

In *Sweden* foreign seeds of clovers, hops, pine and fir are required to be dyed with a solution of eosin before they are offered for sale.

In *Victoria* the Government is empowered to prescribe the proportion and character of foreign ingredients in seeds sold, and the invoices, circulars and advertisements of merchants constitute a warranty that the seed sold or offered for sale does not contain an amount of foreign ingredients in excess of that prescribed by law, and that the seed is solely of the kinds specified in the invoice. Powers are taken as to sampling, analyses and prosecution.

In *Hungary* penalties are imposed on sellers of clover and lucerne seed which is not absolutely free from dodder. An Act of 1895 imposes penalties up to £25 for the adulteration of agricultural produce. With packets of seeds exceeding 10 kilog. (22 lb.) in weight the seller must make a declaration of the percentage of pure seeds on the sack, the offer and the invoice, and such percentage must be expressed as a definite number (*e.g.* "80-90" per cent. pure is not allowed). If examination by a seed-control station shows a purity of 5 per cent. below that declared the merchant is liable to a penalty. Should some branch of agriculture be endangered by the inclusion of noxious plants the Ministry of Agriculture can prohibit or restrict the "circulation" of plants, parts of plants and seeds.

In the *United States* the regulation of the internal sale of seeds is a State and not a Federal matter. A few examples may be given: In *New York* no person may have on sale for seeding, seeds of grasses or clovers containing more than 3 per cent. of foul or foreign seeds unless every receptacle is plainly marked with the percentage of such seeds. In *Wisconsin* the purity must be stated of lots of seeds above 1 lb. sold. Seeds of grasses, forage plants, rape, flax and cereals must not contain certain weed seeds in greater proportion than one seed to 1,000; and even where such weed seeds are present in fewer numbers than this there must be a statement on the label specifying the weed seeds present. Certain other weed seeds are defined as impurities, and, if present to the extent of more than 2 per cent., the percentage must be stated on the label. (Statements of the percentage of weed seeds present seem more likely to strike the buyer's notice than the statement of purity required in Hungary.) In *Michigan* seeds of cereals, clover, lucerne, forage plants and garden plants, if above 1 lb. in quantity, must not contain more than 2 per cent. of weeds. In *New Hampshire* every lot of agricultural seeds sold must be accompanied by a written guarantee of purity from foreign seeds; the test on which the dealers make their guarantees must be made in such a manner as the Secretary of the State Board of Agriculture shall decide. Seed sold in *Maryland* in quantities greater than 1 bush. is required to be labelled with a statement of its purity and the amount of foreign matter.

Facilities for Analyses of Seeds: Control Stations.—In countries where the laws require that farm seeds shall be sold according to their degree of freedom from weed seeds, or rule that guarantees must be given with seed sold, it has been necessary to provide facilities for seed "analysis" by competent authorities whose certificate would be accepted in a court of law. Such facilities have also been provided or aided by the Governments of countries which have tried less militant means of improving the purity of seeds sold. Among such means may be included: (*a*) Government sampling of merchants' stocks and publication of the results of the analyses, and (*b*) the system of "controlled" firms (see below—Switzerland and Hungary).

It is probable that if one country establishes efficient methods (import regulations, sale of seed regulations, and financing of control stations) for preventing the sale of impure seeds, others are induced to follow in the same road. Indeed, it has been openly stated in the United States that the efficient control of seeds in some Continental countries forced the adoption of drastic regulations in the States, because merchants tried to find an outlet in America for their lower grades of seed which were unsaleable on the Continent. It seems quite likely that the same may be said for England at the present time as she is almost the only important country having no adequate seed regulations and no official seed-testing station.*

In several countries the Government has its own seed-testing stations, *e.g.* in *Denmark* at Copenhagen; in *Hungary* at Budapest; in *Switzerland* at Zurich; in *Holland* at Wageningen; in *Canada* at Ottawa and Calgary; in *Ireland* at Dublin; and in *Scotland* at Edinburgh. These stations are commonly under the direction of the Department of Agriculture. In Germany seed-testing is done at the great agricultural teaching centres, and is standardised through the medium of the Association of Agricultural Experiment Stations. In some countries, including several of those mentioned above, seed-testing work is subsidised by the central or local authorities or both; instances are to be found in *Sweden* (15), *Germany*, *Hungary* (4); and in the United States the testing is done by the agricultural colleges and experiment stations, which are either entirely under the State government or else subsidised.

Testing for farmers is, in numerous instances, carried out free of charge. Merchants seem more often to have to pay. In Canada even merchants' seeds are tested free.

Ireland and the *United States* furnish examples of the attempt to improve the trade by the publication of the results of analyses of samples taken from merchants' stocks. In Ireland samples of certain agricultural seeds may be taken and tested for purity and germination; the names and addresses of the persons upon whose premises samples were taken *may be published*, together with the results of tests. Michigan, New Jersey, New York, New Hampshire, and Maryland (among others) are examples of the practice in the United States; the results of the tests are usually published in an annual or biennial bulletin.

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* Ireland and Scotland already have official seed-testing stations, and since the above was written it has been officially announced (see p. 782), that an official station is being organised for England.—*Ed.*

In *Austria-Hungary*, by arrangement with the seed-testing stations, their representatives will examine warehouse samples of clover and lucerne seed, and, if free from dodder, the sacks are sealed with an official lead stamp. Merchants prefer to sell seeds which have been examined, and trade is thereby improved.

In *Switzerland* an arrangement exists between the seed firms, the farmers and the Ministry of Agriculture acting through its official stations. The firms bind themselves to give certain guarantees, *i.e.* purity, origin, absence of dodder in forage seeds, absence of flax dodder from flax seed, absence of other weed seeds and proportion of burnet in sainfoin. Customers of such controlled firms have the right to free analyses by the control station, and the controlled firms are bound by the arrangement to compensate where the seeds are found below the guarantee. A yearly list of these controlled firms is published, and they must annually send at least five samples of their goods for analysis. They are removed from the list if they trade in articles of low value or are guilty of fraudulent practices. The annual payment for the analyses varies with the yearly outturn of the firm, and the whole of the firm's goods must be placed under control. The object appears to be to place uncontrolled firms at a disadvantage and to compel them through self-interest to become controlled firms.

Eradication of Weeds from Farm Lands.—Many countries have attempted to deal with this side of the problem, and the legislative methods prescribed by most of them are very similar. Certain weeds are proscribed by legislation, or power is given to the authorities to proscribe weeds, and farmers are thereupon required to eradicate these weeds from their fields within a specified period. This necessitates compulsory powers of inspection, penalties for failure to destroy weeds, and power to destroy the weeds without the farmer's consent and at his expense.

In *Ireland* the Department of Agriculture and Technical Instruction is empowered, with the consent of the Council of any county, to declare ragwort, charlock, coltsfoot, thistle, and dock to be noxious weeds throughout the county; notices may be served on occupiers of land, ordering them to destroy the weeds in the manner specified, with penalties in the case of default; inspectors are empowered to enter on land in search of noxious weeds.

In the *Isle of Man* if thistles, cushags and common docks remain uncut when developing flowers (or at latest on 1st August) Commissioners of Districts may require them to be cut, under penalty. A Court of Summary Jurisdiction has power to authorise a person to cut down weeds, and a Justice of the Peace can, in certain circumstances, authorise entry on land to ascertain the presence of weeds.

In *Geneva* the Department of Agriculture and the Interior can require growers to take measures necessary to destroy weeds, and in default the Department can itself carry out the measures at the expense of the persons.

In *Germany* measures are taken by most States against the spread of various weeds ; the measures are carried out under police orders and under penalty of fine or imprisonment in default.

In *Belgium** the destruction of thistles is ordered at times determined by Provincial Governors. The Ministry of Agriculture is empowered to stop damage by plants other than thistles in serious cases. Uncultivated land is similarly liable as regards the destruction of weeds. In default the Burgomaster can destroy the weeds at the expense of the defaulters. Field guards and police have the duty of discovering and reporting infractions, for which a fine is imposed.

In *Hungary* every landowner is required to destroy the Serbian thistle before it flowers, and dodder immediately after its appearance at the latest at the beginning of May. The methods of destruction are prescribed by the Minister of Agriculture. Clover and lucerne fields must be watched and, if dodder is not eradicated by the date fixed, reported to the village authorities. The latter must have all clover and lucerne fields inspected 10 days after the fixed date, and if they are badly infested must proceed with the eradication at the farmer's expense. It is forbidden to leave patches of weeds at the time of mowing or cutting ; weeds which after harvest or mowing have already reached the seed stage are to be gathered at once and burnt Where harmful plants appear within the limits of the village in such numbers that their destruction can only be successfully effected by municipal action or State aid, the case must be reported to the Minister of Agriculture, who sends experts to conduct an examination, prescribe the method of destruction and control its execution. Compensation may be given for damage in case of precautionary measures only. Inspectors from the seed stations are appointed to explain the methods of eradication of dodder, and if they discover that a district is badly infested the fact must be reported to the Ministry of Agriculture.

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* The particulars as to Belgium relate to the period before the War.

British Dominions.—A good deal of legislation of this kind exists in Australia, New Zealand, South Africa and Canada. For example, in *Manitoba* the country has been divided up into districts for the purpose of weed inspection, each inspector being allotted a district, and in time each district will be thoroughly worked. Weeds are divided into two classes, and a tax of 50 cents an acre is levied on land badly infested with those in the "noxious" class, the tax being remitted if the inspectors' instructions for the eradication of the weeds have been followed. In *Saskatchewan* a drastic Act has been passed. The owner or occupier must, under penalty, use all reasonable means to destroy weeds on his land. Every inspector of the Department of Agriculture who finds weeds in a young grain crop must notify the owner; and, after threshing, may require him to burn all straw and refuse, or else to tie them up in sacks and not let them leave the farm. Where the land is very bad the farmer may be required to leave it fallow during the ensuing summer or else sow a hay crop. An infested crop may be condemned to be ploughed in or else cut and burnt. The Noxious Weeds Act now makes it obligatory on all municipalities, rural or urban, to appoint one or more inspectors to enforce the provisions of the Act. In 1916, 1,303 inspectors were appointed, responsible at all times for the proper enforcement of the Act. Besides this the Province was divided into six districts, for each of which a field representative was appointed by the Weeds and Seeds Branch of the Department of Agriculture to superintend and guide the work of the inspectors. In *Alberta* a provision to enforce the ploughing under or burning of infected crops is also in force, and in default the operation can be carried out at the farmer's cost.

In the various *South African* Colonies there are stringent measures especially designed to prevent the spread of Bathurst Burr (*Xanthium spinosum*).

Cleaning of Threshing Machines.—*New Zealand* and several provinces of Canada have regulations with regard to the cleaning of threshing machines before they leave one farm for the next. In *New Zealand* threshing machines, chaff cutters and clover dressers which are used on more than one farm are required to be thoroughly cleaned out after being used at each farm. In *Alberta*, not only is cleaning of the threshing machine required, but threshers must clean the grain they thresh, a maximum content of noxious weeds in the threshed grain being fixed. *Saskatchewan* requires a notice as to the necessity for cleaning the machine before removal to another farm to be fixed in a prominent place on the machine. In *British Columbia* every person who knowingly conveys noxious seeds or grains from one farm to another, either in threshing machines or fanning mills, is liable to a fine up to 100 dollars for each offence.

Feeding Stuffs.—In *Canada* legislation has been designed to prevent the spread of weeds through the medium of feeding stuffs, there being a risk of the seeds passing unharmed through the animal. The Canadian Act of 1911 specifies that bran and middlings must be free from noxious weeds. In *Alberta* a maximum content of noxious weed seeds is fixed for grain sold for feed. It is provided that bran, shorts, chopped or crushed grain or cleanings must not be marketed if they contain noxious weeds unless germination has been destroyed.

Provisions for the destruction of screenings containing seeds of noxious weeds are also fairly general. In *Alberta* the screenings from grain may be fed to sheep on the farms if the sheep enclosures are open to inspection by the weed inspectors.

Work of an Educational Character.—Instruction by inspectors in methods of eradicating weeds in *Hungary* has been mentioned above. In *Denmark* annual grants are given by the Government to agricultural societies to provide prizes for members who keep their fields free from weeds. In *Canada* the Seed Branch of the Department of Agriculture organises very successful field-crop competitions, seed fairs, and provincial seed exhibitions to encourage the production of pure weedless seed.*

NOTE.—An account of certain Continental seed-control stations was given in a Supplement to this *Journal*, August, 1914 and an article dealing with the work of the Irish station appeared in the *Journal*, October, 1914

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* See also p. 726.

ECONOMY IN THE USE OF VEGETABLE SEEDS.*

A COMBINATION of circumstances arising out of the war has led to the prospect of a scarcity of vegetable seeds and at the same time to an increased demand for them. It is therefore very important that the strictest economy should be exercised in the sowing of seed.

Many of the methods of sowing commonly used by growers of vegetables are wasteful. The ways of avoiding waste lie mostly in three directions: (*a*) in the method of purchase; (*b*) in the time and method of seed-sowing, and (*c*) in the care of the young seedlings.

Purchase of Seeds.—Whenever it is possible to do so, inquiry should be made of experienced cultivators in the neighbourhood with the object of finding out what varieties of each kind of vegetable do best in the district.

When this has been done the seed order should be made out in good time, *e.g.* by the end of October, and should be placed with a reputable seedsman. The importance of obtaining seed of high quality cannot be too strongly emphasised, for seed which is unsatisfactory in germination, cleanness, and trueness to name is not economical.

In many cases Allotment Associations, Food Production Societies and similar organisations have during the past season purchased seed co-operatively. This practice is undoubtedly a wise one, but it should be remembered that in the long run it is more economical for seed to be purchased in packets rather than in bulk. The distribution of seed purchased in bulk is generally a wasteful process in the hands of the amateur who has neither the machinery nor the skilled labour necessary for measuring and packeting.

At the suggestion of the Food Production Department, many of the retail seedsmen are making arrangements to put up *packets of seeds for allotment holders*, each containing the small but sufficient quantity of seed suitable for sowing in an allotment of from 10 to 12 sq. rods.

With the object of assisting the allotment holder in making out the seed order, the quantities of seeds of each kind of vegetable needed for an allotment of this size are given in Table I. Needless to say, it is not suggested that all the kinds of vegetables mentioned in Table I. will be required for any one allotment. The allotment holder should decide which kinds of vegetables he intends to grow and make out his order accordingly.

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* Food Production Leaflet No. 8.

Allotment holders and gardeners who have larger areas to deal with should be guided by the particulars given on pp. 715-717.

TABLE I.

Name of Vegetable.	To Sow up to :—	Quantity of Seed for 10–12 rod Allotment.
Beet—		
Long	100 feet	½ oz.
Globe	100 ,,	½ ,,
Spinach	100 ,,	½ ,,
Beans—		
Dwarf (double row)	50 ,,	½ pint.
Broad (double row)	50 ,,	½ ,,
Runner (double row)	50 ,,	½ ,,
Cabbage, etc.—		
For spring use (say 125 plants)	—	⅛ oz.
For autumn use (say 125 plants)	—	⅛ ,,
Savoys (say 125 plants	—	⅛ ,,
Broccoli, late variety (say 60 plants)	—	1/16 ,,
,, late variety (say 60 plants)	—	1/16 ,,
,, sprouting (say 125 plants)	—	⅛ ,,
Brussels sprouts (say 125 plants	—	⅛ ,,
Cauliflower, early variety (say 60 plants) ..	—	1/16 ,,
,, late variety (say 60 plants) ..	—	1/16 ,,
Kale, cottagers (say 125 plants)	—	⅛ ,,
,, curled (say 125 plants)	—	⅛ ,,
Carrot—		
Long	75 ,,	⅛ ,,
Intermediate	75 ,,	⅛ ,,
Celery (say 125 plants)	—	1/32 ,,
Leek	90 ,,	⅛ ,,
Lettuce—		
Cabbage	60 ,,	⅛ ,,
Cos	60 ,,	⅛ ,,
Onion—		
For spring and autumn sowing for harvesting	120 ,,	½ ,,
For pulling green or pickling	45 ,,	½ ,,
Parsnip	75 ,,	½ ,,
Pea—		
Dwarf (double row)	40 ,,	½ pint.
Taller (double row)	40 ,,	½ ,,
Spinach	120 ,,	½ oz.
Turnip—		
Spring sowing	75 ,,	⅛ ,,
Summer sowing	75 ,,	⅛ ,,
Vegetable marrow	—	12 seeds.

Seed-Sowing.—Where seeds are purchased in packets and not by weight it should be remembered that it may not be necessary to sow the whole quantity. By following the advice given here, and by adopting the method of sowing illustrated in the Sowing Chart (*see* Fig.), no more than the right quantity need be sown. Any surplus should be kept for future use. (See p. 719).

Sow in straight rows (drills) instead of broadcasting, because :—

(1) It requires less seed.
(2) The seed can be distributed more evenly.
(3) There is less waste and less trouble in thinning the young plants.
(4) Hoeing, the most important cultural operation while the crop is growing, can be easily performed.
(5) It makes it easier to apply artificial manures to the growing crop.

It should be remembered that seedlings of many plants which it is not usual to transplant, may be transplanted with success if lifted carefully in the young stage when the soil is moist, and the weather dull.

TABLE II.

1 oz. of seed of—	Sown—	Will suffice for rows totalling—
Beet	8 inches apart	400 feet
Carrot	6 ,, ,,	600 ,,
Chicory	9 ,, ,,	600 ,,
Lettuce	6 ,, ,, for small varieties.	600 ,,
,,	12 ,, ,, for large	900 ,,
Onions for harvesting	4–6 ,, ,,	350–480 feet
,, for pulling green	Continuously along drill	180 feet
Parsley	4–6 inches apart	350 ,,
Parsnip	8 ,, ,,	300 ,,
Salsify	8 ,, ,,	250 ,,
Spinach	6 ,, ,,	250 ,,
Swede	9–12 ,, ,,	800 ,,
Turnip	6 ,, ,,	600 ,,

1. *Quantity of Seed required for a given length of row for Crops not to be transplanted.*—Small seedlings are open to many dangers in their early stages of growth. It is therefore necessary that sufficient seed should be sown to allow for losses which may occur.

Seeds of such crops as parsnips, onions, carrots, turnips, beets, spinach, beans and the like, which are finally to stand at a certain distance apart, should not be sown continuously all along the drill ; instead, one seed in the case of beans, two of beet, three or four of the other seeds mentioned in Tables II. and III., and eight or ten in the case of parsnips, should be sown intermittently "dot wise," that is, in groups, at intervals corresponding to the distances apart at which the plants are finally to stand. (See Sowing Chart).

TABLE III.

1 pint of Seed of—	Sown—	Will suffice for rows totalling—
Broad bean	9 inches apart	100 feet double row.
French bean	6 " "	200 " "
Scarlet runner	9 " "	100 " "
Pea	2 " "	60–80 " "

A few reserve seeds of the beans should be sown thickly near the end of the row for transplanting to fill up gaps where seeds have failed.

The length of row given in Table III. applies to seeds of average size; it will vary somewhat according to the variety sown, *e.g.* the Early Mazagan bean is much smaller than the longpod type, and would thus sow a longer row. The figures given may, however, be accepted as a guide.

2. *Sowing of Crops to be transplanted.*—Seeds of crops which it is possible or desirable to transplant should also be sown in drills, and only the quantity necessary to produce the desired number of plants for transplanting should be sown Leeks, lettuces, all sorts of cabbages, cauliflowers, kales, etc., autumn sown onions (outdoor), spring sown onions in pots, may all be transplanted. Even greater economy of seed and greater certainty of securing the required number of plants are obtained by sowing the seeds in soil in cold frames or in pots or boxes covered with glass.

Co-operation in the raising of plants which are usually transplanted results in marked economy of seeds. In order to provide a guide for those who may wish to practise the co-operative raising of seedlings, the quantity of seed necessary to produce 1,000 plants of the vegetables in common use is given below. This number is larger than would be needed in an ordinary garden.

Where only a few plants are required, it is more economical, though less interesting, to purchase them than to raise them. It is important that purchased plants should be of good varieties and free from disease such as club root.

Quantity of Seed required to supply 1,000 Plants for transplanting.—When sown in drills out of doors 1 oz. of seed of

Brassicas of all kinds (broccoli, cauliflower, kohl rabi, kale, Brussels sprouts), of leek and of onion, and ⅛ oz. of lettuce are sufficient to produce 1,000 plants for transplanting. If the plants are raised under glass and pricked out into boxes before planting outdoors half these quantities will suffice for 1,000 plants.

1¼ oz. of cucumber seed will suffice for 1,000 plants.
½ „ of tomato „ „ „
¼ „ of celery „ „ „
6 „ of vegetable marrow „ „
18 „ of pumpkin „ „ „

The small grower may be guided as to the number of seeds of cucumbers, tomatoes, celery, vegetable marrow and pumpkin which it is necessary to sow by the table on p. 720 showing the usual percentage of germination.

The Tables make ample allowance for losses arising from germination failures and attacks of pests, so long as the usual precautions are taken.

The number of seeds which are generally capable of germination out of 100 seeds sown in shown in the table on p. 720. The percentage of germination is often higher, but sometimes owing to age of seed or bad harvest-years it is not quite so high.

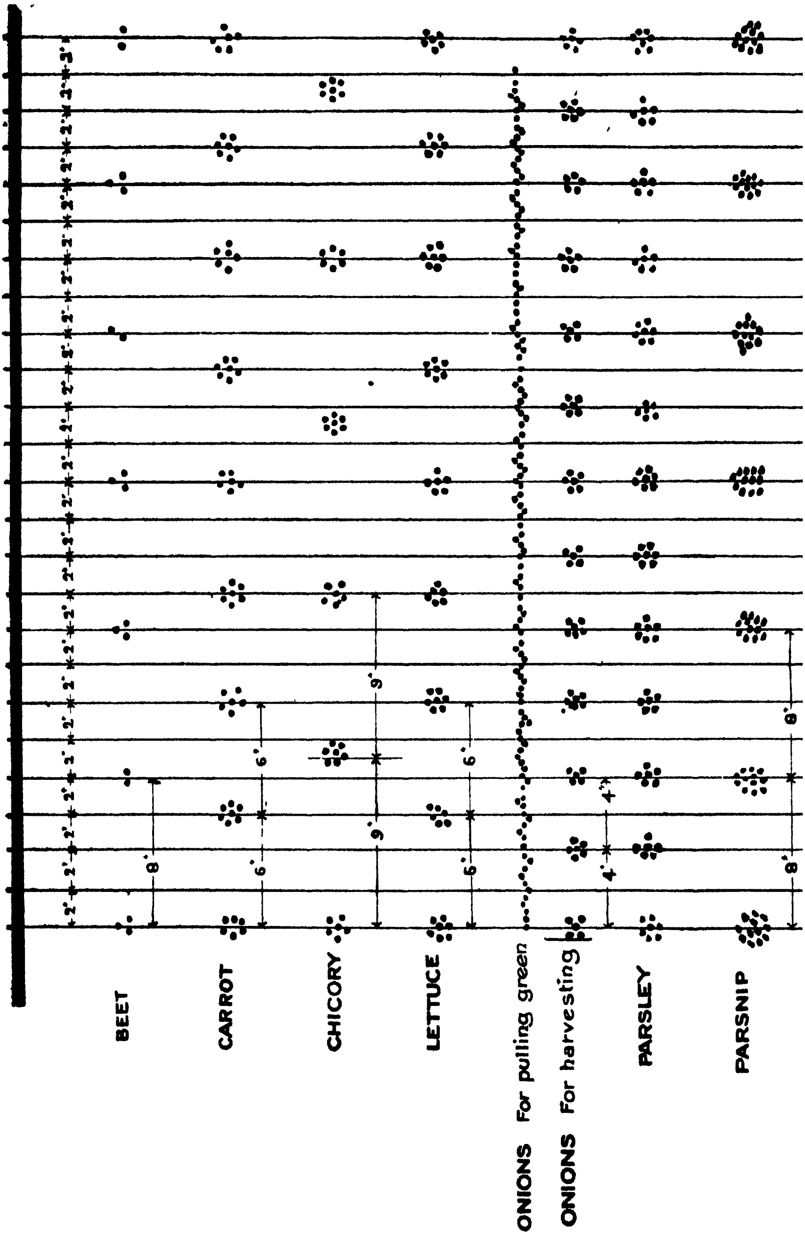
3. *Vegetables grown from Tubers.*—*Jerusalem Artichokes.*—Jerusalem Artichokes are grown from tubers, not seeds. 14 lb. of artichoke tubers set 1 ft. apart will plant a row 72 ft. long.

Potatoes.—For planting 1 sq. rod and allowing 2 oz. for the average weight of the individual tubers the following quantities are required.

	EARLY: at 2 ft. between the rows and 1 ft. in the row.	MID-SEASON: at 2 ft 6 in between the rows and 1 ft. 3 in. in the row.	LATE: at 3 ft between the rows and 1 ft 6 in. in the row.
No. of sets ...	136	88	60
Weight of seed...	18 lb. (about 2½ gal.)	10½ lb. (about 1½ gal.)	7½ lb. (just over 1 gal.)

NOTE.—1 sq. rod = 1 sq. perch = 1 sq. pole = 30¼ sq. yd. = $\frac{1}{160}$ acre and is an area equal to a square 5½ yd. each way.

Time and Method of Sowing.—If seeds are to germinate and develop satisfactorily labour must be devoted to the preparation of the seed bed; a fine tilth is the best insurance against failure and in newly broken ground, where the difficulty of obtaining this condition is great, additional care should be should be sown intermittently " dot wise " that is in groups



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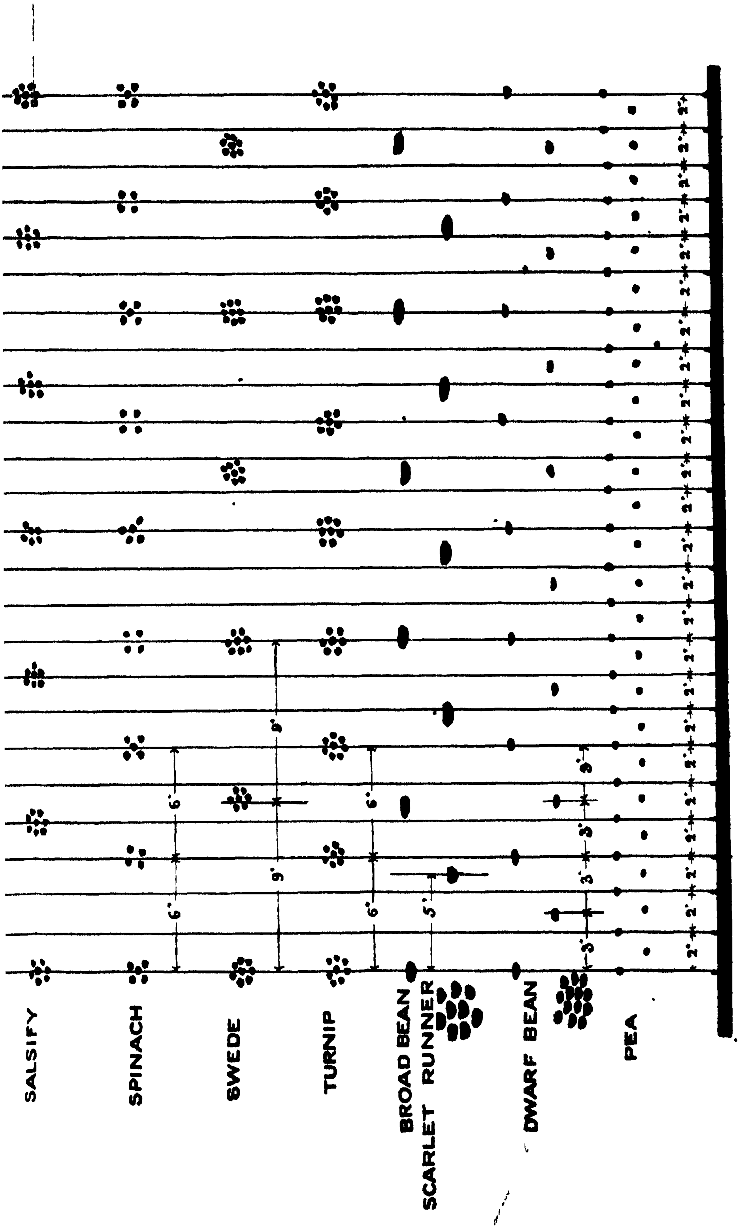

SOWING CHART.—Thin lines are 2 in. apart; numerals represent inches.

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exercised. Some soils are not naturally moist and free, and must therefore receive special attention. The dug ground should be thoroughly pulverised by means of the fork and hoe and raked down so as to form a fine tilth before the drills are opened.

Much seed is wasted by sowing when the soil conditions are unfavourable.

The soil should be moderately moist but not wet or sticky. It should be capable of being raked down to a fine surface. The seed bed should be firm, *i.e.* not too freshly dug, or if freshly dug it should be trodden or rolled before seed sowing, *but this must not be done while the soil is wet.*

If the soil is wet the drill may be opened a day or two before the seed is to be sown so that drying may be hastened.

If too dry, the open drill after opening may be watered well a few hours before sowing the seed.

Beans, peas and other large seeds may be soaked in water for 24 hours before sowing in order to aid germination, but soaked seeds must not be sown in dry soil.

Seeds of tender plants such as French beans, runner beans and marrows, should not be sown until risk of damage to the seedlings by frost is past.

Seeds of hardy plants should not be sown in very cold soil, for they would lie long before they germinate and would be liable to rot.

Drills (furrows) should be made with the draw hoe, straight, at regular distances apart and of even depth throughout. Care should be taken not to bury small seeds too deeply. If the soil is light they may safely be sown at a slightly greater depth than if it is heavy.

Turnips, cabbages and carrots, and similar small seeds should be sown at a depth of ½ in., onions and spinach at ¾ in., parsnips ¾ to 1 in., peas at ½ to 2 in., French beans and scarlet runner beans at 2 in., and broad beans at 3 in.

The frequent use of the hoe between the drills is a great aid to the vigorous growth of seedlings. Where such slowly germinating seeds as onions or parsnips are sown, the drills may be easily marked by mixing a quickly germinating seed like radish with the main crop. The radishes may be drawn and used as soon as large enough.

Sowing Small Seeds.—(1) When difficulty is experienced in sowing thinly on account of the small size of the seeds economy may be secured by first mixing them with some fine earth and then sowing. *The mixing must be done thoroughly.*

(2) Small or light seeds must be sown in calm weather, otherwise they may be wasted by being blown away from the drills.

(3) Carrot seed is usually sown only after the hooks which it naturally bears have been rubbed off, but if saved at home, these hooks may cause the "seeds" to cling together. This may be prevented by rubbing them with some fine sand.

The success of the seed bed depends on due attention being paid to thinning or singling. Seedlings should be thinned before they become crowded. Thinning should not be done when the soil is dry, and every care should be taken not to loosen the plants that are to remain.

Thinnings of beet, onion and even parsnips may be used for filling in blanks. It is better to thin gradually and not to do the whole of the thinning at one time.

The later thinnings of carrots and onions may be used in the kitchen.

Protection of Seeds and Seedlings.—Seed beds may be protected from hot sun by brushwood or lath screens which can be readily removed. They should be made so as to lie on pegs 1 or 2 ft. above the surface of the bed. They give partial shade and yet allow free circulation of air.

In many cases seeds and seedlings fall victims to the attacks of pests.*

Mice and Birds.—Red lead dusted on seeds slightly damped with water protects the seed against these pests. Birds which attack seedlings may be kept off by stretching strands of black thread along the rows 2 in. above the ground, before the seedlings come through.

Slugs and Snails.—Dust sharp grit, sifted ashes, soot or lime along the rows, renewing it after a shower.

Surplus Seeds.—Where the whole of the available seed is not wanted in one season, the surplus should be kept in a dry place until the next, or given away to those who are able to use it. Vegetable seeds generally keep good for several years, but the percentage of germination decreases each year.

To Test the Vitality of Seed.—Take two kitchen plates and place a piece of flannel or blotting paper in the bottom of one of them; damp it thoroughly, count out and place on it 100 of the seeds to be tested. Place another piece of well-moistened flannel or blotting paper on top of the seeds and then cover with the second plate placed upside down. Stand in a warm, but not hot place, and examine from day to day, removing and counting the seeds that have germinated. The flannel or blotting paper must be kept moist but not wet. When germination has ceased the percentage of living seeds may be ascertained and the bulk sown accordingly. A smaller number than 100 of such large seeds as beans may be used for the germination test. If the germination is too low, repeat the test in order to be sure that no mistake has been made.

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* Leaflets dealing with Insects and other Pests and Fungi injurious to farm and garden crops may be obtained free of charge and post free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

Average Germination of Common Vegetable Seeds.—The average germination of common vegetable seeds is given below. Although germination is apt to be variable, the following list gives a safe figure on which to base expectations. If on testing the seed the number of germinating seeds out of 100 is found to be less than the number indicated in the table, more seed must be sown. Thus, if only 30 out of 100 leek seeds germinate instead of the 60 estimated, twice the quantity of seed should be sown.

Average Germination of 100 *Seeds.*

Broad bean	90	Leek	60
French or kidney bean	90	Lettuce	88
Scarlet runner bean	90	Mustard	80
Beet	70	Onion	75
Broccoli	80	Parsnip	25
Cabbage	80	Parsley	50
Carrot	55	Pea	80
Cauliflower	80	Pumpkin	75
Celery	50	Radish	80
Chicory	80	Salsify	90
Cress	80	Spinach	68
Cucumber	80	Tomato	80
Kale	80	Turnip	75
Kohl Rabi	80	Vegetable Marrow	80

Beet "seed" consists of the ripened flower and seed of several flowers each with one seed; therefore it often happens that more than one seedling comes from a single so-called seed. If these are counted, 100 "seeds" will produce about 130 or more seedlings.

PIG FEEDING IN WAR TIME.

PART I.

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THE large pig-breeding areas of the Eastern Counties of England usually depend almost entirely on corn for feeding their pigs; unlike the farmers of the dairying districts, the corn-growing farmers seldom have any whey or other dairy by-products which are so valuable as supplementary food when feeding for bacon or pork. Before 1915, pig breeders in the Eastern Counties relied upon sharps and "meal" (ground barley) for feeding sows suckling their young, and upon "meal," and to a much smaller extent upon sharps, when feeding pigs for the production of either small porkers (called "Londoners"), bacon hogs, or large fat pigs (often called Birmingham "cutters"). Sharps, or any of the finer wheat offals, and barley meal were, of course, helped out to a very considerable extent by maize, and, if quality was desired, by a small proportion of peas or beans added to the barley when the "meal" was ground; this addition of pulse was perhaps most frequently made when feeding the large "cutter" pigs. Maize was used when it was cheaper than barley, and rice-meal was very occasionally used for the same reason. Sometimes gram, and even lentils were substituted for pulse, and other feeding stuffs have been known to be used; but barley-meal and the finer wheat offals, whether called "sharps," "middlings," "pollards," or by some other name, were the mainstay of pig feeding, both before and after weaning.

By the opening of 1917, war conditions had practically deprived the pig-feeders of "meal," and sharps were very dear and very scarce. The Cambridge University Department of Agriculture therefore determined to ascertain how far it was possible to eliminate both articles from the pig's diet. This article gives an account of the work carried on in this connection at the University Farm since February last.

Breeding Sows.—Early in February, four fine, well-grown, pedigree Large White gilts, aged about 13 months, were purchased at a public sale from a well-known breeder. All four gilts were in pig, two of them being gone two months, and the two others three months. They had a long journey to Cambridge in very trying weather. On their arrival, after three days of pollard "slop" feeding, a small mid-day meal of *dry* cake was fed; this consisted of ½ lb. a head of mixed linseed and ground nut cakes, and was readily eaten. Careful watching revealed no preference for one or other of these cakes. On the following day (14th February), the morning meal of pollard slop was replaced by a mixture of cut mangolds and "gluten feed." On the 15th February, the allowance of mixed cake was increased to 1 lb. per head per day. On the 17th, the pollard slop was discontinued altogether, and the evening feed replaced by a mixture of cut mangolds and gluten feed. Sows, which on the 12th February were feeding on pollard slop only, were therefore, on the 17th, consuming *dry* cake and *dry* gluten meal mixed with cut roots, sharps and slop-feeding having been abandoned after five days. With few exceptions, to be mentioned later, no slop of any sort and no "sharps" or "meal" were fed to the sows afterwards, though four fine healthy litters have been reared, and the sows are now (3rd September) again heavy in pig.

Ration for In-pig Sows.—As the four gilts were pregnant on their arrival, it was impossible to ascertain their exact body weight, but it was estimated that they averaged 300 lb. live-weight per head, and on this assumption trial rations were calculated. Ten days after slop had been discontinued, the sows were found to eat:—

Morning Feed ..	9 lb.	cut mangolds + 1 lb. maize gluten feed.
Mid-day ,, ..	1 ,,	linseed cake, 1 part. ground nut cake, 1 part.
Evening ,, ..	9 ,,	cut mangolds + 1 lb. maize gluten feed.

It was found that a larger proportion of maize gluten feed than the above made the pigs costive, and put them off their feed. The sows drank a considerable quantity of water and at first they would eat the cut roots and leave as much maize gluten feed as possible. The distaste for maize gluten feed was, however, never noticed after the right proportions had been established.

The pigs had access to a 10-acre pasture, and from the first were noticed to graze a little—as much in fact as the state of the weather allowed. Some care had to be taken about the state of their bowels. On 25th February, after 11 days of dry food and cut-root feeding, it was found desirable to give them a feed of slop containing 2 oz. of Epsom salt for each animal. Subsequently, whenever the dung became sticky and adhesive to the skin round the anus, or if the sows showed any signs of straining when defecating, a slop composed of bran and sharps in equal proportions was fed. This relaxing feed was required about once a week till the grass came, and then less frequently. It should be emphasised, however, that the system of dry feeding is somewhat constipating.

Whilst the cut mangolds and the dry linseed and ground nut cakes were fed continuously, various foods were tried for mixing with the roots—*i.e.* maize gluten feed, palm kernel cake and coconut cake. These feeding stuffs were all used either singly or mixed in various proportions, and each one was found to be as satisfactory as any of the others. It was found advisable to break the cakes up into very small pieces, and with the palm nut cake, extra trough room had to be given, as this cake cannot be eaten rapidly, and slow eating seems to give the bully of the pen an extra advantage. A little salt was given dry* along with the cake.

On the above rations the four young sows farrowed down in excellent condition with the results given in Table I. It will be within the recollection of all how very trying the weather was for very young pigs during March and early April.

TABLE I

Sow.	Name.	Date of Pigging.	Number of Pigs.		
			In Litter.	Died.	Weaned.
No. I	Sundon Cantab Jane ..	Mar. 11th, 1917	7+1**	2†+1‡	4
No. II.	Sundon Cantab May ..	Mar. 11th, 1917	10	3§	7
No III.	Sundon R. M. Cantab..	April 10th, 1917	5	0	5
No. IV.	Sundon Cantab Maggie	April 7th, 1917	9	1‖	8

The dates of service printed in the sale catalogue were incorrect, so that the pigging in several cases occurred unexpectedly, and the sows received the dry cake and cut mangold feeding right up to the time of farrowing. Possibly it would have been better to have fed slop for three days before farrowing, but in only one case, and that a very doubtful one, did the absence of liquid food seem to have done any harm. For three days after the birth of the pigs a change to slop diet was made* and then gradually the dry cake and cut root feeding was resumed.

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* About a teaspoonful of rocksalt once a week.

** Born dead, probably died on journey in February.

† Laid on night of birth.

‡ Result of eating straw chaff when only 14 days old.

§ Died on night of birth, probably from cold.

‖ Killed, as eight were thought enough for a first litter.

Rations for Suckling Sows.—With slight variations the ration fed throughout the suckling time was as follows :—

Cut mangolds	20 lb.	Mixed and fed half in the morning and half in the evening.
Mixture of 2 parts palm kernel cake and 1 part coconut cake	2 „	
Dry linseed cake	1 „	Mixed and fed at mid-day.
Dry ground nut cake..	1 „	

The quantities of food set out above only represent the average ration over the whole period, for the actual amounts fed were below the standard ration when the pigs were very young, and were gradually raised above the standard ration as the pigs grew older. The sow with the largest litter, too, had her allowance of cake in the middle of the day increased to an average of 2½ lb. But for large white sows, suckling their first litters, the quantities given may be taken as a fair average over the whole period. Until early in May, the cut roots and broken cake were mixed once in 24 hours and divided into two feeds. But by the end of the first week in May the weather got hot, and experience showed it to be much better to mix the morning's feed overnight and the evening's feed in the morning, so that the sows always received their meal within 12 hours of its being prepared.

The little pigs did well—particularly well considering the season. On a few occasions costiveness on the part of the sows had to be corrected. A pigling now and then was noticed to be scouring, but a mild dose of Epsom salts fed to the mother in slop soon cured the trouble. The sows were allowed all the day-grazing possible, and by 22nd April the two elder litters were regularly grazing with their mothers. On 4th April the 7 piglings, which were doing particularly well, seemed to be pulling their mother (No. II.) down more than was good for so young a breeding sow, so it was decided to offer them some sharps slop.† This in a few days they ate freely. Accordingly at about the same age this slop was fed to the litter of 8 piglings. The other two litters did not receive slop till the weaning time approached. Besides their slop the piglings ate freely of their mother's cut root and broken cake mixture. This at first caused us no little alarm since the food was somewhat coarse for such small piglings, but as the youngsters seemed to thrive they were allowed the benefit of such nourishment as they contrived to steal. It was, of course, impossible to ascertain how much they consumed, but all the time the mother was eating they were noticed to be taking their share.

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* As the war-bread milling has given the farmer quite a new sort of offal, it may be useful to put on record that 1 part of sharps to 4 parts of water by weight was found to be the best mixture, and that the sows ate 8 lb. of sharps per head per diem.

† It was found that 1 part of sharps to 4 parts of water by weight suited them best, and that it was important to use the right proportions

TABLE II.

Sow.	Nos. in Litter Weaned.			Weights of Piglings.			Age when Weaned.
	Boars.	Sows.	Total.	Heaviest	Lightest	Average.	
				lb	lb	lb	days.
No. I. ..	2	2	4	37	30	32·75	59
No. II ..	5	2	7	35	20	29·28	57
No. III ..	4	1	5	37	27	33·40	57
No. IV. ..	5	3	8	34	24	27·37	60
Average	4	2	6	35·75	25·25	30·12	58·25

Table II. gives the weights of the piglings at the time of weaning. When it is remembered that the litters were all those of young gilts breeding for the first time, and during very bad weather, it is safe to say that the weights compare favourably with those obtained under any ordinary good commercial system of rearing. The health and general appearance of the suckers was all that could have been desired at time of weaning

Management of Sows after Weaning.—Throughout the summer the four young sows were kept on a medium-quality pasture on stiff, boulder clay land, and each received daily an allowance of 3 lb. of dry cake-mixture (consisting of equal parts of palm nut kernel cake and coconut cake), but no swill of any kind. The terribly dry weather of the late spring and first half of summer tried this system of feeding very hard. Now and then a few pounds of "six weeks" turnips were given, but never more than at the rate of 5 lb. per head per day.

At the beginning of September the four sows were heavy in pig[*] and looking well, showing that even in such a trying season as 1917 proved to be a dry cake ration as a supplement to grass-land grazing may be used successfully for in-pig sows.

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[*] Since the above was written, the 4 sows have farrowed and now (3rd October) have 43 strong piglings from 4 to 8 days old.

It should be pointed out, too, that the grazing was on second-rate clay pasture which had suffered particularly badly from the drought in May, June and July.

It is interesting to put on record that an old sow, one that in her time had been got up for show and so taught to be fastidious, refused absolutely to be fed on war rations. This disinclination was very marked when an attempt was made to fatten her off for slaughter. Indeed, she actually lost weight, and so had to be put on to a slop of sharps and ground tail corn, on which diet she fattened rapidly.

SEED PRODUCTION IN CANADA.

DURING the early years of the present century a determined effort was made to raise the quality of the seed commonly used on Canadian farms, and one of the most fruitful results of the campaign was the establishment of the Canadian Seed Growers' Association. This is a voluntary organisation, closely co-ordinated with the Seed Branch of the Dominion of Agriculture, and its function is to complete the work of the experimental farms by assisting in the multiplication and distribution of seed from selected strains of field crops.

The Association owes its origin to the Macdonald Seed Grain Competition which was organised by the Seed Branch (then the Seed Division) of the Department in 1900, and lasted over three seasons. This competition was financed by Sir William Macdonald, of Montreal, with the object of stimulating the production of good seed which, by its subsequent use, would provide a practical demonstration of its value. At the close of the competition, farmers interested in seed production were invited to form an association, with the result that in 1904 the Canadian Seed Growers' Association was organised on a permanen basis, the organisation being eventually made quite distinct from the Department of Agriculture. The constitution embodies regulations for growing seed, issue of certificates, and the appointment of officers. These consist of a President, three Vice-Presidents, an Executive Council of five, and a Board of 20 Directors made up of two representatives from each province The active members are chiefly farmers who, by growing their crops under certain standardised conditions, can obtain an official certificate of quality for their seed. Members pay no regular subscription to the Association, but are charged a fee for the inspection and registration of their seed.

On joining the Association a member obtains from an experiment farm, or from another member of several years' standing, a supply of " foundation stock seed " of the particular variety which he wishes to grow. On sowing this seed he sets apart a plot (not smaller than ¼ acre for corn crops) to be cultivated with special care ; from this he picks out by hand at harvest a sufficient number of ears, or pods, or potato hills, etc., to sow a similar sized plot the following year. The remaining produce of this plot is known as " élite stock seed," and its progeny up to and including the third generation is known as " registered seed." A plot of élite stock grown each year provides the farmer with a continuous source of pure seed.

Certificates are issued by the Canadian Seed Growers' Association both for élite stock seed and for registered seed. In all cases where a farmer wishes to obtain a certificate for his seed, his crops must be inspected during growth and must obtain a favourable report on their freedom from disease and weeds, also on their general condition of tillage. After threshing, the farmer forwards a sample of his seed to the head quarters of the Association at Ottawa where it is examined for quality, purity and germination capacity. If the sample is up to standard, then a second inspection of the produce is made when the crop has been bagged, and on being passed as true to sample the bags are closed and sealed by the inspector. An arrangement exists by which the inspection of the growing crops is undertaken by the Provincial Departments of Agriculture, while the inspection of the bagged seed is carried out by officers of the Canadian Seed Growers' Association. All registered seed is entered in a catalogue which is issued annually by the Association and widely circulated over Canada, so that the growers are given every chance of finding a good market for their produce.

Owing to the labour involved in maintaining a supply of élite stock seed the number of producers of registered seed had only reached 181 in 1913, and the demand for registered seed far exceeded the supply But as soon as there are a number of men in any one district ready to take up the work of seed production, the labour involved can be considerably reduced if they form themselves into a so-called seed centre and appoint one or two of their number to produce the élite seed for the whole group. This modification which was first tried in 1913 proved a success, and by 1914 there were 64 such seed centres in existence. Since then the production of registered seed has increased enormously.

The funds of the Canadian Seed Growers' Association are chiefly derived from the Federal Department of Agriculture, whose original grant of $2,000[*] per annum was raised to $6,000 in 1912–13; the Department also takes upon itself the expense of printing and distributing the annual reports of the Association. Inspection and registration fees form the only other source of income. The Association charges—

For each visit of inspection of seed grown by members in a regularly organised seed centre	$1.00
For each visit of inspection of seed grown by independent members..	$2.00
Additional fees for sealing the bags:	
Up to 200 bush., per bush.	$0.02
Over ,, ,, ,, ,, ..	$0.01
Or if the member prefers, for each day the inspector is on the premises ..	$4.00

Besides the assistance given to the Canadian Seed Growers' Association, the Government has adopted various other means for raising the standard of crop and seed. In 1906, Field Crop Competitions were first held in some of the western provinces, and since then they have gradually spread over the whole Dominion. They are usually organised by local farmers' societies who pay a part of the expenses; financial help is also given by the Provincial and the Federal Departments of Agriculture in the form of grants towards the prize-money. Judges are provided free by the Provincial Departments and they travel round the country and make their awards on the condition of the fields before harvest. In 1915–16 nearly $26,000 was contributed by the Federal Department towards the expenses of these competitions.

In close connection with the Field Crop Competitions are the Seed Fairs and Provincial Seed Exhibitions. The Seed Fairs are generally run by local societies and the Provincial Exhibitions by the Provincial Departments, on dates so fixed that prize-winners at the Seed Fairs may have a chance of competing at the Provincial Exhibition. Prize-money and funds for the general expenses of these shows are drawn from Federal, Provincial and local sources, and judges are provided by the Provincial Departments. Though the Canadian Seed Growers' Association itself holds no seed fairs, the part it plays in the production of good seed in Canada is recognised by the fact that in many of the Provincial Exhibitions special classes are set apart for its members. In fact, in such exhibitions the exhibitors are divided into three distinct classes :—(1) Members of the Canadian Seed Growers' Association, (2) Winners of the Field Crop Competitions, (3) Others.

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[*] One dollar = 4*s.* 2*d.*

Seed Fairs are often combined with exhibitions of other classes of agricultural produce, and in some parts of the Dominion become the centre of great social gatherings. A notable feature of the Seed Fairs and Provincial Exhibitions is the auction sale of exhibits, held after the award of prizes. The distribution of the best grain is considered to be so important that in some provinces the Government reserves the right to take over all the prize-winning exhibits for the purpose of diffusing the strains over the whole province. Federal grants for the year 1915–16 amounted to $6,800 for Seed Fairs, and $3,900 for Provincial Seed Exhibitions.

Notes on Rat-traps.

THE following notes on simple rat-traps, together with their explanatory diagrams, have been communicated to the Board by Captain A. Fuller-Maitland :—

1. *The Disc or Lid Trap.*—A cask or other similar receptacle is placed on end. The top of the cask is removed and the open end is fitted with a special cover or lid, preferably made of tin. This cover consists of an outer annular part which fits on to the cask and slopes slightly towards the centre, an inner, narrower ring with a steeper slope towards the centre, and a disc or tilting lid in the centre. The tilting lid may be attached to the inner ring either by a spindle running across the diameter of the disc and projecting on either side or by any other kind of projection, and is so balanced that when the bait is tied on the lid comes to rest in the horizontal position. It can be made fast in this position by a bolt when the trap is not in use.

The cask may be empty, or better still may contain a few inches of water with an island in the middle formed of a couple of bricks. In this way the first rats to be captured climb on to the island and commence squeaking, thereby attracting other rats on to the top of the cask.

Before setting the trap, the rats should be fed for several days on the cask with the lid bolted into position. They become familiar with the cask as a feeding place and are more easily caught when the trap is set. Sperm oil should be smeared all around the tilting lid when the trap is set, so that there should be no chance of the rats being able to save themselves. To make the trap accessible to the rats, it may be placed near a table or shelf; or planks can be placed against it; or the cask may be sunk in the ground, this method being specially useful near corn stacks.

The discs or covers take up little space when packed in bulk and can be made in various sizes.

2. *The Table or Shelf Trap.*—This trap usually consists of a hinged and counterpoised leaf or slab projecting horizontally from a table or shelf. It is preferably made of tin, and when not set is fixed in the horizontal position by a bolt at A (see Fig. 2). When set, the pin at A is removed and food is tied on at B; the leaf should also be slightly oiled. A rat venturing on to the leaf makes it swing down at an angle and the rat falls into the tub of water below. The leaf is then brought back to its horizontal position by the counterpoise weight. With this as with all other traps the rats should be fed on the trap for some days before setting it.

3. *The Table Slope Trap.*—This trap is similar to No. 2, but instead of the hinged leaf being counterpoised it is supported underneath by a movable prop, which regulates the slope of the shelf. For some days before setting the trap, the leaf is fixed at a slight slope and baited, so that the rats become accustomed to getting the food without losing their foothold. When the trap is set, the angle of the slope is made slightly sharper and the surface is oiled. The rats slip off it into a receptacle below.

4. *The Plank Trap.*—A plank 3 or 4 in. wide is placed over a cask forming a run or pathway between two points such as tables, dressers, etc., where the rats usually feed. At a point D, over the cask, the plank is sawn across diagonally and the section A D is hinged at C and counterpoised at A. When the trap is not set, the section A D is kept in position by a prop inside the cask or by a bolt at A. When set, the prop or pin is removed and the rats, running as usual over the run, fall into the cask. The trap sets itself again automatically.

5. *The Pipe Trap.*—A and B (Fig. 5) are two forms of a trap which is particularly useful in dwelling-houses and other places where a portable apparatus is required; it may be fitted quickly to any table, shelf or dresser. A tube made of metal or pottery, and of a diameter sufficiently large to allow the body of a rat to pass down it, is bent at right angles, one end being fastened to the table or shelf and the other hanging down vertically. In the bend there is a recess for the bait. The tube should be oiled or greased and the rats, attracted into

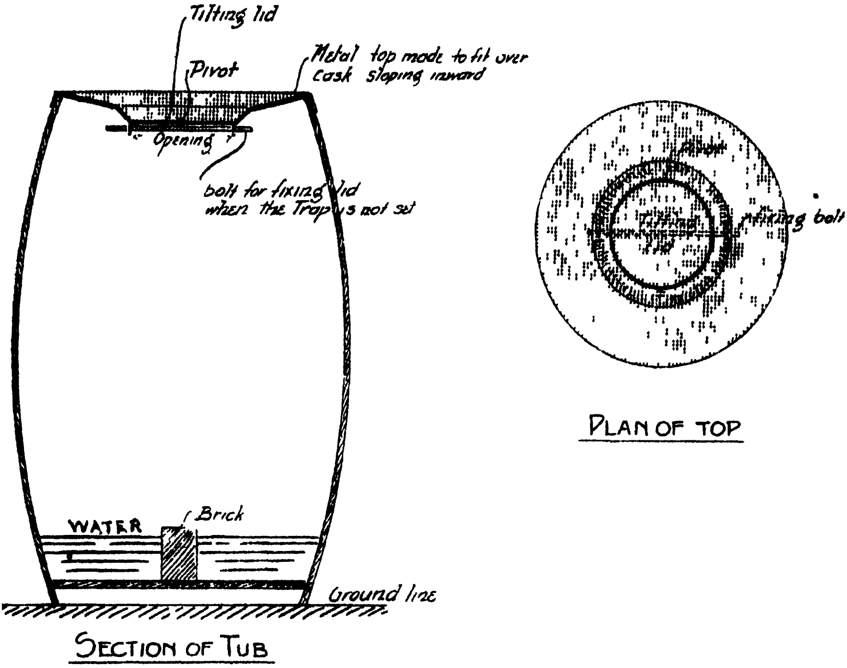


FIG. 1.—The Disc or Lid Trap

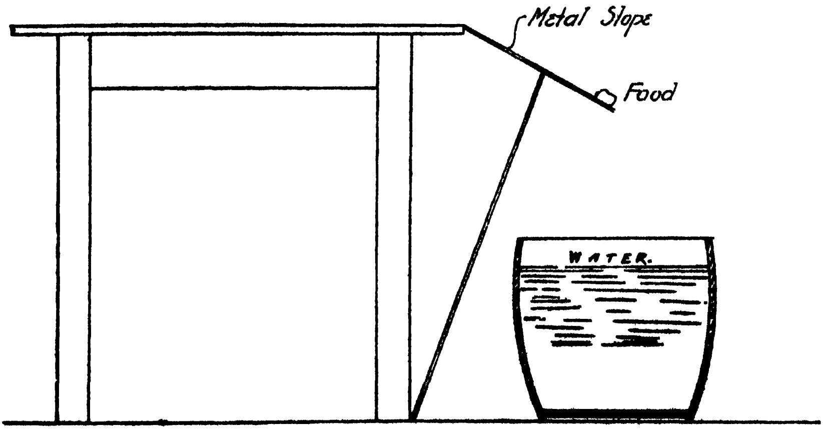
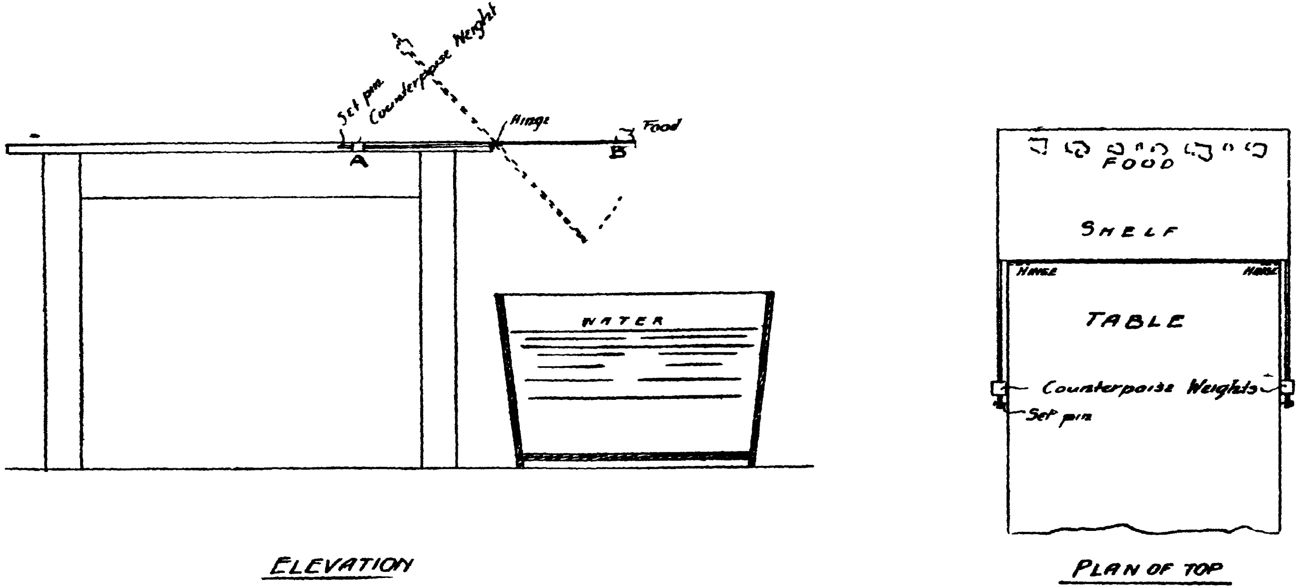


FIG 3—The Table Slope Trap.



ELEVATION

PLAN OF TOP

FIG. 2 —The Table or Shelf Trap

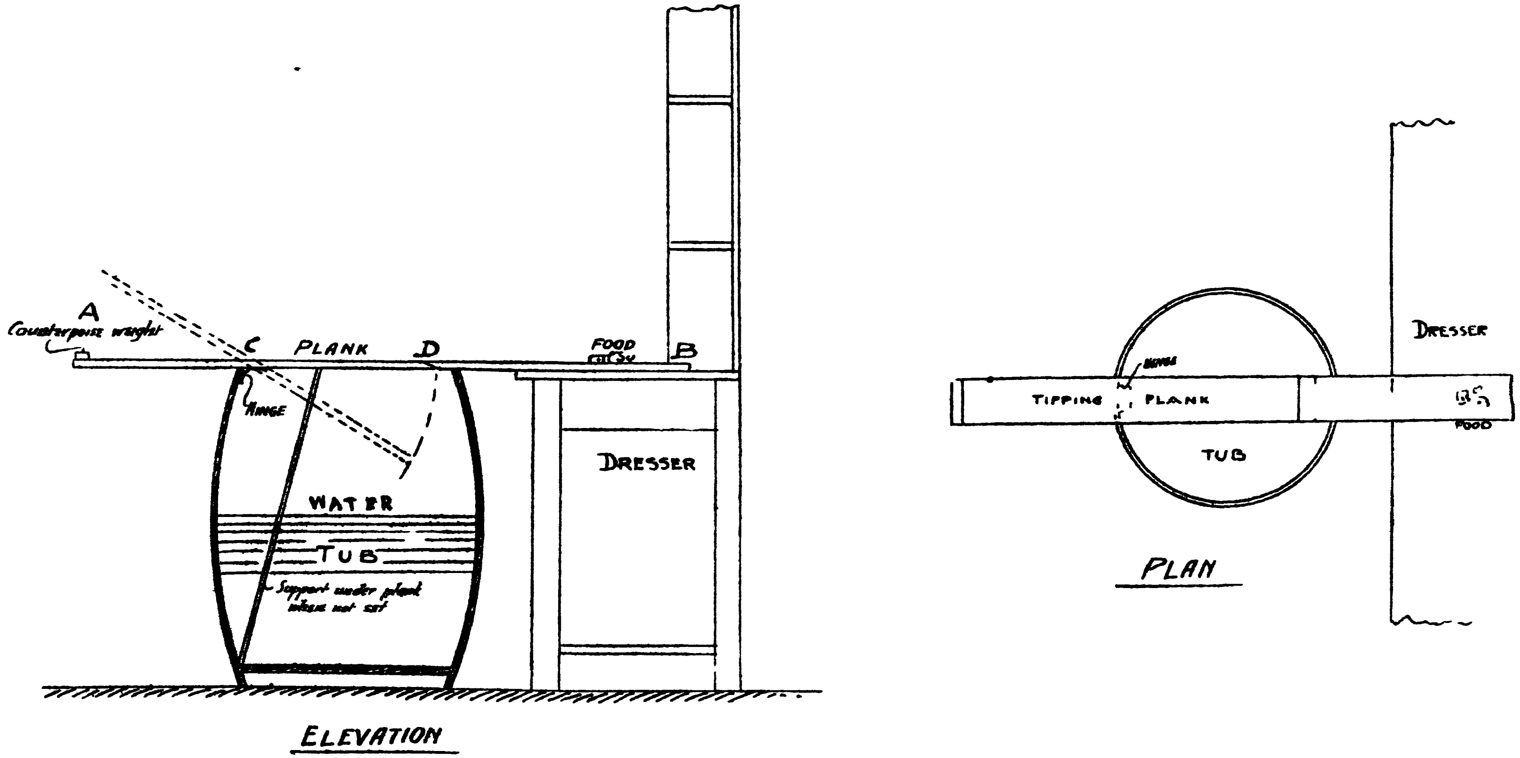


FIG 4 —The Plank Trap

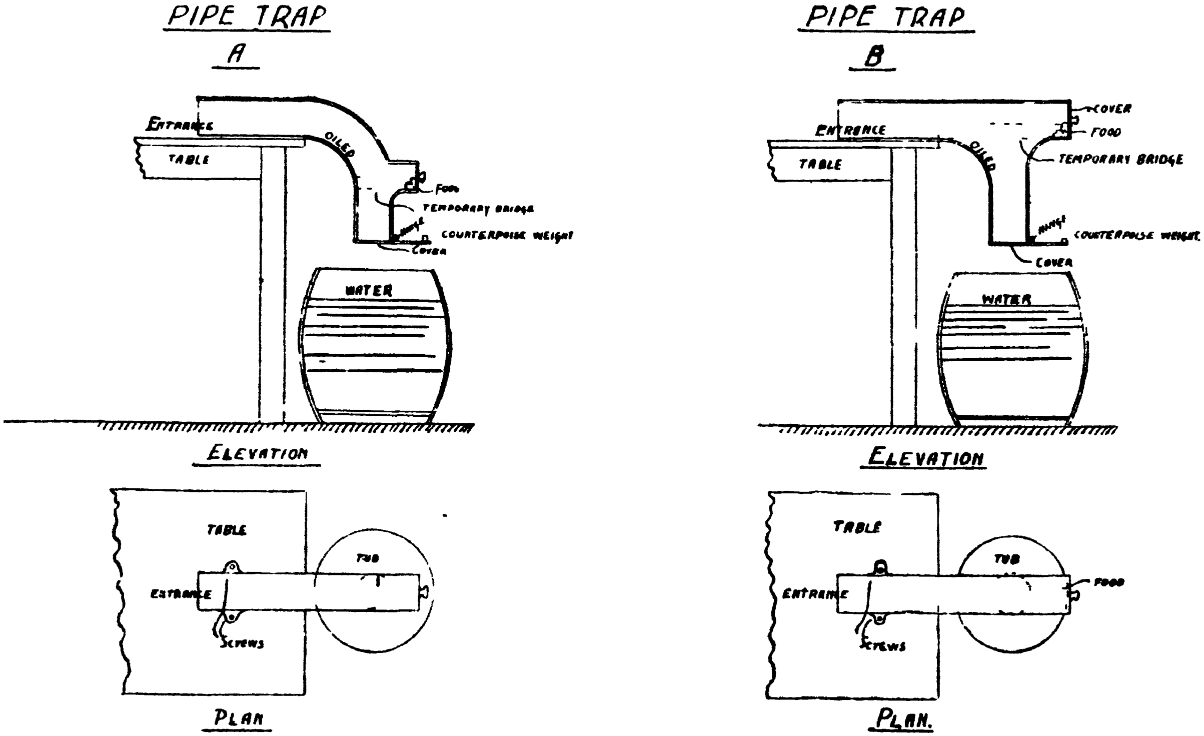


FIG. 5.—The Pipe Trap

the tube by the bait, slip down the bend and into a bucket or tub of water placed ready to receive them.

Further particulars about the traps may be obtained from Captain A. Fuller-Maitland, 15, Fourth Avenue, Hove, Sussex.

The Cultivation of Rye as a Grain Crop.*

In recent years the area of rye grown in England and Wales has been comparatively insignificant (about 50,000 acres), though formerly it was, next to wheat, the chief grain crop, and in Northern European countries is still by far the most important bread crop. The chief reason for the decline of rye in this country was the preference shown by most people for perfectly white bread, though the introduction of the Norfolk 4-course rotation which made it possible to grow barley, oats, and even wheat on comparatively poor light soils, was a contributing factor.

At the present time, considerations other than mere preference or prejudice have to be the deciding factors and, as with the exception of wheat, rye is the grain most suitable for milling purposes, a very considerable increase in the area devoted to this crop on poor light soils is called for. On such soils rye is the most productive and safest grain crop; it can be grown satisfactorily with very little manure (an important consideration when supplies of manure are so limited), and the farmer whose land and climate are suited to the crop stands to gain by responding to the call made in the national interests.

In order to ensure an adequate supply of seed for the increased area which is anticipated, the sale of sound undamaged rye except for seed has been prohibited up to January 1st, 1918.† Any farmer having difficulty in securing seed should apply to the Agricultural Executive Committee for his county. Anyone in doubt as to the suitability of a particular sample for seed should communicate with the Food Production Department, 72, Victoria Street, London, S.W. 1.

The cultivation of rye is extremely simple. On the light sandy or gravelly soils to which it is suited there is no difficulty in obtaining a tilth. The seed should be sown as early as possible, preferably in August or early September, so that the plant is well established before winter sets in. This not only reduces damage by frost-lifting in winter, but minimises the risk of the soil "blowing" in spring, an important point in many sandy districts. While early sowing is strongly recommended the crop can, however, be sown up to about the beginning of March, and every year considerable areas are taken after potatoes and turnips and sown in late autumn. The rate of seeding varies from 2 to 3 bush. per acre according to the time of year, condition of soil, and method of sowing.

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* Food Production Leaflet No. 10.

† *Journal*, August, 1917, p. 583.

The method of sowing naturally varies according to circumstances. If taken after a ley, it may be sown broadcast on the pressed furrow and harrowed in On a stubble it is more likely to be drilled. After a potato crop the seed is frequently broadcasted and simply ploughed in to a depth of 2 or 3 in. This plan reduces labour to a minimum, gives a firm seed bed, and reduces damage by rooks. (It need hardly be said that no more should be sown than will be covered during the yoking.) In spring a good harrowing and heavy rolling complete the cultivation, though if growth has been strong and the land is in sufficiently good condition to force it along afterwards the crop may be grazed down with sheep in April and afterwards allowed to ripen as a grain crop.

Rye is to some extent the " Cinderella " of farm crops, and seldom receives special manuring, but under present conditions when it will often be taken as a second grain crop it should certainly receive good treatment, and on the poor soils under consideration there is every reason to expect handsome returns for any expenditure incurred. On poor chalky soils 2 or 3 cwt. of superphosphate given when sowing and 1 or 1½ cwt. sulphate of ammonia in winter or early spring is recommended. Really sandy soils are often very deficient in lime, and though the practice is opposed to common ideas basic slag may with advantage be substituted for superphosphate in such cases.

Provided the soil is in good condition and the crop secures a good start before winter, neither a hard winter nor a dry summer is likely to affect rye to any extent. The crop is usually the first to be harvested, and gives an excellent opportunity for the growth of a catch crop or for cleaning the land.

An additional advantage is the high price which can often be realised for the straw for padding harness, and its value for thatching, covering potato clamps, etc., need hardly be mentioned. It is of practically no use for feeding purposes.

In some districts the return from the crop is considerably increased by sowing along with the rye a small quantity (not more than about ½ bush. per acre) of winter vetches. Such a small proportion is easily supported by the rye, the cost of harvesting is not increased as the mixed crop can be cut by the binder, and the two classes of seed are separated by the screen of the threshing machine. Vetch seed is nearly always scarce and high in price. The demand is most likely to increase, and those who intend growing rye on the poor chalky soils so well suited to vetches are urged to adopt this practice on at least part of their rye area. The vetch straw has a high value for feeding, and cattle can be trusted to separate it quite efficiently from the rye straw. Where the rye straw is required for thatch the vetch straw will, of course, be combed out in the process of " drawing " the thatch.

Comparative Money Values of Feeding Stuffs.*

THE accompanying tables are intended as a guide to the farmer in deciding whether it is economical to sell oats and replace them by purchased feeding stuffs, and how this replacement can best be effected. The tables may also be used to compare the values of any of the feeding stuffs included.

Each table gives the estimated values per ton as compared with oats at prices ranging from 38*s*. to 48*s*. per quarter of 336 lb.

The values are intended to apply to the best conditions of farm practice, so that they must be regarded as *maximum* values in relation to the value of oats. In all cases the values are given to the nearest shilling, but, since the methods of assessment used cannot be regarded as precise, variations of a few shillings should be regarded as negligible.

In making the comparison, allowance must be made for the cost (cleaning, haulage, etc.) of the double transaction of marketing the oats and bringing the purchased food to the farm. The sum of these two costs (per ton) must be deducted from the values given in the tables for the different feeding stuffs and the reduced values thus arrived at compared with the market quotations.

> *Example.*—Suppose 46*s*. per qr. (336 lb.) be offered on the market for the oats, and that the estimated cost of delivery, etc., be 1*s*. per qr. (=6*s*. 8*d*. per ton). Suppose further that the cost (additional to quotation) of bringing the purchased food to the farm be 3*s*. 4*d*. per ton. Then the total cost of the double transaction is 6*s*. 8*d*. plus 3*s*. 4*d*., or 10*s*. per ton, and this sum must be deducted from the values given in the tables in the column under

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* Food Production Leaflet No. 13.

oats at 46*s.* per quarter. Thus, taking Table I., the quotation for linseed cake (9 per cent. oil) must not exceed £21 18*s.* (*i.e.* £22 8*s.* less 10*s.*) if the sale of oats and purchase of this cake is to be justified.

Explanation of the Tables.—*Table I.*—The values given in this table have been assessed by the "food unit" method, which takes into account the manurial as well as the nutritive value of the feeding stuffs. It is the method always used in trade calculations, and almost always for other purposes. The number of "food units" in each feeding stuff is ascertained by multi-

TABLE I.

Estimated Value per ton of different Feeding Stuffs as compared with Oats at various Prices, taking both Nutritive and Manurial Values into account.

Oats at Per qr. (336 lb.)				38*s.*	40*s.*	42*s.*	44*s.*	46*s.*	48*s.*
Per Ton				£ *s.* *d.* 12 13 4	£ *s.* *a.* 13 6 8	£ *s.* *d.* 14 0 0	£ *s.* *d.* 14 13 4	£ *s.* *d.* 15 6 8	£ *s.* *d.* 16 0 0
	Albuminoids %	Oil % .	Food Units (Oats, 75.)	£ *s.*	£ *s.*	£ *s.*	£ *s.*	£ *s.*	£ *s.*
*Linseed Cake ..	28	12	111·0	18 15	19 15	20 15	21 15	22 14	23 14
* „ „ ..	30	9	109·5	18 10	19 9	20 9	21 8	22 8	23 7
* „ „ ..	32	6	107·8	18 4	19 3	20 2	21 1	22 1	23 0
*Decorticated Cotton Cake	40	10	120·3	20 6	21 8	22 9	23 10	24 12	25 13
Undecorticated Cotton Cake,									
Egyptian ..	23	5½	73·4	12 8	13 1	13 14	14 7	15 0	15 13
Bombay ..	19	5	67·0	11 6	12 18	12 10	13 2	13 14	14 6
Palm Kernel Cake ..	19	7	92·2	15 11	16 8	17 4	18 0	18 17	19 13
„ „ Meal, Extracted ..	18	2	86·2	14 11	15 6	16 2	16 17	17 12	18 8
Coconut Cake ..	21	10	101·8	17 4	18 2	19 0	19 18	20 16	21 14
*Ground Nut Cake, Decorticated ..	47	7	133·0	22 9	23 13	24 16	26 0	27 4	28 7
Undecorticated ..	30	9	102·7	17 7	18 5	19 3	20 2	21 0	21 18
Beans	25	1½	101·7	17 3	18 2	19 0	19 18	20 16	21 14
Peas	23	1½	101·3	17 2	18 0	18 18	19 16	20 14	21 12
Maize	10	4½	92·5	15 12	16 9	17 5	18 2	18 18	19 15
Maize Gluten Feed ..	24	10	116·9	19 15	20 16	21 16	22 17	23 18	24 19
Maize Germ Meal ..	13	12	101·7	17 3	18 2	19 0	19 18	20 16	21 14
Malt Culms	24	1½	87·7	14 16	15 12	16 7	17 3	17 19	18 14
Brewers' Grains,									
Dried	20	6	78·8	13 6	14 0	14 14	15 8	16 2	16 16
Wet	5½	1½	21·2	3 12	3 15	3 19	4 3	4 7	4 10
Distillers' Grains,									
Dried	25	10	99·1	16 15	17 12	18 10	19 8	20 5	21 3
Wet	7	2½	26·8	4 10	4 15	5 0	5 5	5 10	5 14
Wheat Middlings (Coarse)	16	4½	90·1	15 4	16 0	16 16	17 12	18 8	19 4
Wheat Pollards ..	15	5	86·5	14 12	15 7	16 3	16 18	17 14	18 9
„ Bran ..	14	4	75·1	12 14	13 7	14 0	14 14	15 7	16 0
Feeding Treacle ..	10	—	78·0	13 3	13 17	14 12	15 5	15 19	16 12
*Fish Meal	56	5	126·3	21 7	22 9	23 11	24 14	25 16	26 19
Linseed	24	36	143·2	24 4	25 9	26 14	28 0	29 5	30 11
Linseed Oil	—	95	217·4	36 14	38 13	40 12	42 10	44 9	46 8

* The figures given for the feeding stuffs marked with an asterisk are probably high, as it is difficult in practice to realise the full value of the albuminoids which are present in high proportions, and which are valued at a high rate by the method of assessment employed. The values suggested will probably be fully realised only when the materials are fed in relatively small proportions in admixture with other feeding stuffs.

plying the sum of the percentages of digestible albuminoids and oil by 2½, and adding the result to the percentage of digestible carbohydrates + digestible fibre.

Table II.—The high value assigned to albuminoids by the "food unit" method of Table I. is partly because of their special value for feeding to young growing animals and to milk cows in conjunction with roots and straw (which are very deficient in albuminoids), but chiefly on account of the value of the manure which they give. Many farmers, however, do not always conserve and use their manure skilfully, and when feeding stuffs are dear the purchase of artificial manures is a safer investment than paying large sums for the manurial constituents of feeding stuffs. Moreover, when hay or grass is available, or when a moderate ration of home-grown grain can be fed, the albuminoids of feeding stuffs rarely have a higher value for the production of beef or mutton than starch (the main constituent of cereals), and in many cases the values even for milk production may not differ appreciably.

TABLE II.

Estimated Value per ton of different Feeding Stuffs as compared with Oats at various prices, taking only Nutritive Value into account.

Oats at Per qr. (336 lb.)		38s.		40s.		42s.		44s.		46s.		48s.	
Per ton		£	s.	£	s.	£	s.	£	s.	£	s.	£	s.
		12	13	13	7	14	0	14	13	15	7	16	0
	Starch Equiv. (Oats, 60).	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.
Linseed Cake, 12% Oil	75·9	16	0	16	17	17	14	18	11	19	8	20	5
" " 9% "	71·8	15	3	15	19	16	15	17	11	18	6	19	2
" " 6% "	67·5	14	5	15	0	15	15	16	10	17	5	18	0
Decorticated Cotton Cake	71·8	15	3	15	19	16	15	17	11	18	6	19	2
Undecorticated Cotton Cake,													
Egyptian	41·2	8	14	9	3	9	12	10	1	10	10	10	19
Bombay	39·4	8	6	8	15	9	4	9	12	10	1	10	9
Palm Kernel Cake	72·8	15	7	16	4	17	0	17	16	18	12	19	8
" " Meal, Extracted ..	64·7	13	13	14	8	15	2	15	16	16	11	17	5
Coconut Cake	80·2	16	19	17	16	18	14	19	12	20	10	21	8
Ground Nut Cake, Decorticated ..	73·4	15	10	16	6	17	2	18	18	19	15	20	11
" " Undecorticated ..	50·3	10	12	11	4	11	15	12	6	12	17	13	8
Beans	67·3	14	4	14	19	15	14	16	9	17	4	17	19
Peas	70·3	14	17	15	12	16	8	17	4	17	19	18	15
Maize	81·5	17	4	18	2	19	0	20	19	21	17	22	15
Maize Gluten Feed	84·4	17	16	18	15	19	14	20	13	21	12	22	10
Maize Germ Meal	82·7	17	9	18	8	19	6	20	4	21	3	22	1
Malt Culms	40·9	8	13	9	2	9	11	10	0	10	9	10	19
Brewers' Grains, Dried	48·5	10	5	10	16	11	6	11	17	12	8	12	19
Brewers' Grains, Wet	13·5	2	17	3	0	3	3	3	6	3	9	3	12
Distillers' Grains, Dried	62·7	13	5	13	19	14	12	15	6	16	0	16	14
Distillers' Grains, Wet	14·9	3	3	3	6	3	10	3	13	3	16	4	0
Wheat Middlings (Coarse)	67·5	14	5	15	0	15	15	16	10	17	5	18	0
Wheat Pollards	65·7	13	17	14	12	15	7	16	1	16	16	17	10
Wheat Bran	45·3	9	11	10	1	10	12	11	2	11	12	12	2
Feeding Treacle	48·0	10	3	10	13	11	4	11	15	12	6	12	17
Fish Meal	53·2	11	5	11	16	12	8	13	0	13	12	14	4
Linseed	118·5	25	0	26	7	27	13	28	19	30	5	31	11
Linseed Oil	227·8	48	2	50	12	53	3	55	14	58	4	60	15

For these reasons it has been thought desirable to include a second table, based solely upon the estimated feeding values of the different materials, without any allowance for manurial values. As a measure of feeding value the "starch equivalent" has been taken, that is, the weight of pure starch which, according to the best information available, would produce the same effect in fattening, milk production, etc., as 100 lb. of the foodstuff.

Table II. will probably give more reliable guidance in cases where foods rich in albuminoids are not required to "balance" the ration, but for general use Table I. should always be employed.

Notes on Feeding Stuffs in November:
From the Animal Nutrition Institute, Cambridge University.

THE chief point of interest this month is the reduced supply of almost all kinds of feeding stuffs. Changes in price are very irregular, but on the whole the tendency seems to be downwards. Palm kernel cake, oats and maize meal are very much cheaper. Ground nut cake, beans and peas are considerably dearer. Other standard feeding stuffs stand at much the same figure as last month.

Horses.—Oats have fallen considerably in price since last month, no doubt because this year's crop is beginning to come on the market, and many farmers will prefer to use their own oats rather than to buy substitutes for their horses.

There is, however, in spite of the lower price of oats, considerable economy in using the rations suggested last month, namely 4 lb. of palm kernel cake, and either 5 lb of pollards or 7 lb. of bran, in place of 10 lb. of oats. No doubt many farmers will use some of their slightly-damaged corn.

Milking Cows.—The Food Controller has recently appointed a Director of Feeding Stuffs, whose first duty will doubtless be to reserve a supply of suitable feeding stuffs for cows in order to maintain the milk supply.

In the meantime it is difficult to give advice on the purchase of feeding stuffs for cows until it is known what action the new Director proposes to take. Farmers, however, cannot go wrong in using palm kernel cake, which is supposed to be specially valuable for milk production. Ground nut cake, although dearer than last month, is still cheap when compared with other cakes. There are two kinds of this cake now on the market: Decorticated ground nut cake, which is a very concentrated food, somewhat similar in properties to decorti-

TABLE I.

Feeding Stuff.	Digestible Food Units.	Approximate Prices per ton at the end of September.									
		London.		Liverpool.		Hull.		Bristol.		Glasgow.	Leith.
		Price.	Supply.	Price.	Supply.	Price.	Supply.	Price.	Supply.	Price.	Price.
		£ s d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	£ s. d.
Soya Bean Cake	122·3	No beans allowed to be imported.	Unobtainable	—	—	19 10 0	Poor	—	—	—	—
Decorticated Cotton Cake	126·3	22 0 0	Small	21 10 6	Limited	—	None	—	—	—	—
Decorticated Cotton Meal	126·3	—	—	—	—	—	—	—	—	—	—
American Linseed Cake	119·0	†19 10 0 ‡19 0 0	Good "	—	—	—	—	—	—	—	—
Indian Linseed Cake	123·1	—	—	—	—	—	—	—	—	—	21 10 0
Russian Linseed Cake	123·5	—	—	—	—	—	—	—	—	—	—
English Linseed Cake	120·1	19 10 0	Fair	20 5 0	Limited	—	None	—	—	20 5 0	§20 0 0
Bombay Cotton Cake	65·3	14 5 0	Very small.	15 0 0	"	14 0 0	Poor	—	—	—	—
Egyptian Cotton Cake	71·9	14 12 6	Fair	15 10 0	"	—	None	—	—	16 5 0	15 5 0
Coconut Cake	102·6	17 12 6	"	19 10 0	Moderate	—	—	—	—	—	—
Palm Kernel Cake	96·1	15 0 0	"	13 15 0	"	12 5 0	Fair	—	—	—	15 10 0
Palm Kernel Meal (extracted)	92·5	—	—	—	—	—	—	—	—	—	—
Ground-nut Cake	145·2	(a)21 0 0 (b)18 0 0	Improving.	—	—	18 5 0	Poor	—	—	—	—
English Beans	99·5	23 3 3	Scarce	23 2 0	Limited	23 11 6	"	—	—	25 0 0	—
Bean Meal	99·5	—	—	—	—	—	—	—	—	—	—
Chinese Beans	101·1	19 16 9	Moderate	21 18 9	Limited	—	—	—	—	—	—
English Maple Peas	97·2	26 13 4	Very scarce.	—	—	28 17 9	—	—	—	—	—
English Dun Peas	97·2	23 6 8	"	—	—	26 13 4	Poor	—	—	—	—
Calcutta White Peas	97·5	29 13 4	Scarce	—	—	—	—	—	—	—	—
American Maize	93·8	18 13 4	"	—	—	—	—	—	—	—	—
Argentine Maize	94·2	19 12 0	Very scarce.	—	—	—	—	—	—	—	—
Maize Meal	86·5	20 0 0	Scarce	—		—	—				
Maize Gluten Feed	121·6	18 10 0	Not so good a supply as a month ago	19 0 0	Scarce	—	—	19 10 0	Small	—	—
Maize Germ Meal	99·2	18 10 0		—		19 0 0	Poor	—	—	—	—

† Top grade. ‡ Western. (a) Decorticated. (b) Undecorticated. § Fixed price ; no trading owing to lack of supplies.

TABLE I.—*continued.*

Feeding Stuff.	Digestible Food Units.	Approximate Prices per ton at the end of September.									
		London.		Liverpool.		Hull.		Bristol.		Glasgow.	Leith.
		Price.	Supply.	Price	Supply.	Price.	Supply.	Price.	Supply.	Price.	Price.
		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	£ s. d.
English Feeding Barley	83·0	15 13 9	—	—	—	14 12 9	Fair	—	—	—	—
English Oats	75·4	14 15 0	Scarce	—	—	14 15 0	„	—	—	—	—
Argentine Oats	75·4	—	—	—	—	—	—	—	—	—	—
Malt Culms	69·9	15 0 0	Improving	—	—	14 10 0	Poor	—	—	14 5 0	15 10 0
Brewers' Grains (dried)	84·5	*17 0 0	„	—	—	16 0 0	„	16 10 0	Fair	16 10 0	—
Brewers' Grains (wet)	21·1	*2 10 0	„	—	—	2 0 0	„	—	—	—	—
Distillers' Grains (English)	101·2	18 10 0	Small	—	—	—	—	17 5 0	Small	16 15 0	16 10 0
Distillers' Grains (French)	101·2	18 10 0	„	—	—	—	—	—	—		
Distillers' Mixed Grains (wet)	20·0	—	—	—	—	—	—	—	—	—	—
Egyptian Rice Meal	78·7	20 0 0	Some	—	—	—	—	—	—	—	—
Burmese Rice Meal	78·7	17 0 0	Moderate	—	—	—	—	—	—	—	—
Rice Bran	78·7	—	—	—	—	—	—	—	—	—	—
Wheat Middlings (coarse)	92·0	15 0 0	Slight increase	—	—	14 15 0	Fair	—	—	16 0 0	15 5 0
Wheat Sharps	92·0	15 7 6		15 10 0	Scarce	14 15 0	„	15 10 0	Small	14 15 0	14 0 0
Wheat Pollards	87·0	—	—	14 15 0	„	—	—	—	—	—	—
Wheat Bran	77·5	13 2 6	Slight increase	—	—	13 10 0	Fair	13 10 0	Fair	14 0 0	13 15 0
Wheat Bran (broad)	79·9	14 2 6		14 17 6	Scarce	15 10 0	„	14 0 0	„	14 5 0	14 10 0
Feeding Treacle	60·0	—	—	22 10 0	Moderate	—	—	—	—	—	26 10 0
Linseed	153·5	30 0 0	Fair	—	—	30 0 0	—	32 0 0	Small	—	¶32 10 0
Linseed Oil	250·0	58 0 0	„	†62 0 0	Moderate	58 0 0	—	5s. per gal.	„	—	—
Egyptian Cotton Seed	108·6	16 10 0	Improving	—	—	19 0 0	—	—	—	—	—
Bombay Cotton Seed	99·6	—	—	—	—	—	—	—	—	—	—
Cotton Seed Oil	250·0	—	—	†79 0 0	—	—	—	—	—	—	—
Fish Meal	145·0	—	—	—	—	—	—	—	—	16 10 0	17 0 0

* Ale. † In barrels. ¶ Crushed.

cated cotton cake, and undecorticated ground nut cake, which has about the same food value as linseed cake. The decorticated kind is the better article and is worth a considerably higher price per ton.

There will doubtless be plenty of damaged corn after the difficult harvest, and many cow-keepers will probably use the more seriously-damaged samples for their cows to save buying other feeding stuffs. Such corn should be crushed, mixed with chaff, damped, and allowed to stand some time before use. If the corn is badly damaged, it is wise to add a little dry salt to the mixture of corn and chaff.

Cattle for Beef Production.—Winter feeding for beef under present conditions was fully discussed last month, when figures were given to show that 2-year-old stores would put on flesh at the rate of about 1 lb. per head per day on roots, hay, and straw, with from 1 to 2 lb. per head per day of cake, preferably either decorticated ground nut cake or decorticated cotton cake. More cake than this is not likely to be available. If anyone uses more others must go entirely without.

Cattle on such a ration will make as much, or nearly as much, manure as cattle on a full cake ration. The manure will contain the same bulk of organic matter which is the constituent required for maintaining the permanent fertility of the soil. It will, however, be deficient in soluble nitrogen as compared with good "cake-fed" manure, but this deficiency can be remedied by the use of a top dressing of sulphate of ammonia, which is home-made and requires no shipping.

Farmers who have damaged corn which they can spare for their bullocks can economise even on the above cake ration.

Sheep.—The number of sheep in the country as shown by the June census has dropped considerably since last year.' Store sheep are scarce and dear, and it will be difficult to secure a normal supply of mutton. It was shown last month that sheep over a year old will put on flesh in the winter at the rate of about 1½ lb. per week on roots and hay, with a minimum of cake—not more than ½ lb. per head per day.

Younger sheep require more cake, and more cake is not likely to be available. It should, however, be possible to spare some oats or damaged barley to supplement the small cake ration for sheep under 1 year old.

Pigs.—All kinds of corn and meal suitable for pigs are scarce and dear. The only foods of which there is likely to be a reasonable supply are millers' offals and palm kernel cake or meal, but even these will not be available in sufficient amount to maintain the normal supply of pigs. The situation will no doubt be eased by the fact that there may be considerable quantities of damaged corn and diseased potatoes which can be used for pig feeding.

TABLE II.

LONDON. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet)	2	4½	English oats	3	11
Ground nut cake	2	8½	Chinese beans	3	11
Maize gluten feed	3	0½	Linseed	3	11
Egyptian cotton seed	3	0½	American maize	3	11¾
Palm nut cake	3	1½	Brewers' grains (dried)	4	0¼
English linseed cake	3	3	Egyptian cotton cake	4	0¾
American linseed cake	3	3	Argentine maize	4	2
Wheat middlings	3	3	Malt culms	4	3½
Wheat sharps	3	4¼	Burmese rice meal	4	4
Wheat bran	3	4½	Bombay cotton cake	4	4¼
Coconut cake	3	5¼	Maize meal	4	7½
Decorticated cotton cake	3	5¾	Linseed oil	4	7¾
Wheat bran (broad)	3	6½	English beans	4	8
Distillers' grains (English)	3	8	English dun peas	4	9½
Distillers' grains (French)	3	8	Egyptian rice meal	5	1¼
Maize germ meal	3	8¾	English maple peas	5	5¾
English feeding barley	3	9¼	Calcutta white peas	6	1¼

TABLE III

LIVERPOOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Palm nut cake	2	10¼	Chinese beans	4	3
Maize gluten feed	3	1½	Egyptian cotton cake	4	3½
English linseed cake	3	4½	Bombay cotton cake	4	7
Wheat pollards	3	4½	English beans	4	8
Wheat sharps	3	4½	Linseed oil	4	11½
Decorticated cotton cake	3	5	Cotton seed oil	6	4
Wheat bran (broad)	3	8¾	Feeding treacle	7	6
Coconut cake	3	9½			

TABLE IV.

HULL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet)	1	11	Maize germ meal	3	10
Ground nut cake	2	6	Wheat bran (broad)	3	10½
Palm nut cake	2	6½	English oats	3	11
Soya bean cake	3	2¼	Linseed	3	11
Wheat middlings	3	2½	Malt culms	4	2.
Wheat sharps	3	2½	Bombay cotton cake	4	3¼
Wheat bran	3	5¾	Linseed oil	4	7¾
Cotton seed	3	6	English beans	4	8¾
English feeding barley	3	6¼	English dun peas	5	6
Brewers' grains(dried)	3	9½	English maple peas	5	11

TABLE V.

BRISTOL. PRICES PER FOOD UNIT.

	s.	*d.*		*s.*	*d.*
Maize gluten feed	3	2¾	Wheat bran (broad)	3	6
Wheat sharps	3	4½	Brewers' grains (dried)	3	11
Distillers' grains (English)	3	5	Linseed	4	2¼
Wheat bran	3	5¾			

TABLE VI.

AVERAGE PRICES PER FOOD UNIT.

LONDON, LIVERPOOL, HULL AND BRISTOL.

	s.	*d.*		*s.*	*d.*
Brewers' grains (wet)	2	1¾	Brewers' grains (dried)	3	11
Palm nut cake	2	10	English oats	3	11
Ground nut cake	2	11½	American maize	3	11¾
Maize gluten feed	3	1½	Linseed	4	0
Soya bean cake	3	2¼	Chinese beans	4	1
Wheat middlings (coarse)	3	2¾	Egyptian cotton cake	4	2
American linseed cake	3	3	Argentine maize	4	2
Cotton seed	3	3¼	Malt culms	4	2¾
English linseed cake	3	3¾	Burmese rice meal	4	4
Wheat sharps	3	4	Bombay cotton cake	4	4¾
Wheat pollards	3	4½	Maize meal	4	7½
Decorticated cotton cake	3	5¼	English beans	4	8¼
Wheat bran	3	5¼	Linseed oil	4	9¾
Distillers' grains (English)	3	6½	Egyptian rice meal	5	1¼
Coconut cake	3	7¼	English dun peas	5	3¼
Wheat bran (broad)	3	8	English maple peas	5	8½
Distillers' grains (French)	3	8	Calcutta white peas	6	1¼
English feeding barley	3	8¼	Cotton seed oil	6	4
Maize germ meal	3	9½	Feeding treacle	7	6

TABLE VII.

GLASGOW. PRICES PER FOOD UNIT.

	s.	*d.*		*s.*	*d.*
Fish Meal	2	3¼	Wheat bran (broad)	3	7
Wheat sharps	3	2½	Wheat bran	3	7½
Distillery mixed grains			Brewers' grains (dried)	3	11
(dried)	3	3½	Malt culms	4	1
English linseed cake	3	4½	Egyptian cotton cake	4	6¼
Wheat middlings	3	5¾	Bean meal	5	0¼

TABLE VIII.

LEITH. PRICES PER FOOD UNIT.

	s.	*d.*		*s.*	*d.*
Fish Meal	2	4¼	Indian linseed cake	3	6
Wheat sharps	3	0½	Wheat bran	3	6½
Palm nut cake	3	2¾	Wheat bran (broad)	3	7¾
Distillery mixed grains			Egyptian cotton cake	4	3[illegible]
(dried)	3	3	Linseed (crushed)	4	3
English linseed cake	3	4	Malt culms	4	5¼
Wheat middlings	3	4	Feeding treacle	8	9¾

TABLE IX.

AVERAGE PRICES PER FOOD UNIT. GLASGOW AND LEITH.

	s.	d.		s.	d.
Fish meal	2	3¾	Wheat bran	3	7
Wheat sharps	3	1½	Wheat bran (broad) ..	3	7¼
Palm nut cake	3	2¾	Brewers' grains (dried) ..	3	11
Distillery mixed grains (dried)	3	3¼	Malt culms	4	3
English linseed cake ..	3	4¼	Linseed (crushed) ..	4	3
Wheat middlings ..	3	5	Egyptian cotton cake ..	4	4½
Indian linseed cake ..	3	6	Bean meal	5	0¼
			Feeding treacle	8	9¾

TABLE X

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Name of Feeding Stuff.	Nutritive Ratio.	Per cent. digestible.			Starch equiv. per 100 lb.	Linseed Cake equiv. per 100 lb.
		Protein.	Fat.	*Carbo-hydrates and Fibre.		
Foods Rich in both Protein and Oil or Fat.						
Ground nut cake	1 : 0·8	45·2	6·3	21·1	77·5	102
Soya bean cake	1 : 1·1	34·0	6·5	21·0	66·7	88
Decort. cotton cake ..	1 : 1·2	34·0	8·5	20·0	71·0	93
Linseed cake, Indian ..	1 : 1·9	27·8	9·3	30·1	77·1	101
Linseed cake, English ..	1 : 2·0	26·7	9·3	30·1	76·0	100
Cotton cake, Egyptian ..	1 . 2·1	15·5	5·3	20·0	40·0	53
Cotton cake, Bombay ..	1 : 2·5	13·1	4·4	21·5	37·6	49
Distillers' grains (English) Distillers' grains (French)	1 : 2·9	18·7	10·2	29·0	57·3	75
Maize gluten feed	1 · 3 0	20·4	8·8	48·4	87·4	115
Brewers' grains, dried ..	1 : 3·5	14·1	6·6	32·7	50·3	66
Coconut cake	1 : 3·8	16·3	8·2	41 4	76·5	101
Palm kernel cake	1 : 4·5	14·1	6·1	48·9	76·7	101
Linseed	1 : 5·9	18·1	34·7	20·1	119·2	157
Bombay cotton seed ..	1 : 6·0	11·0	16·8	30·1	77·5	102
Fairly Rich in Protein, Rich in Oil.						
Maize germ meal	1 : 8·5	9·0	6·2	61·2	81·0	107
Rice meal	1 : 9·4	6·8	10·2	38·2	68·4	90
Rich in Protein, Poor in Oil.						
Fish meal	1 . 0·1	54·0	4·0	—	60·0	78
Peas, Calcutta white ..	1 . 2·1	23·3	1·1	45·9	66·9	88
Beans, English	1 : 2·6	19·3	1·2	48·2	67·0	88
Beans, Chinese	1 : 2·6	19·6	1·7	47·9	67·0	88
Peas, English maple ..	1 : 3·1	17·0	1·0	50·0	70·0	92
Palm-nut meal (extracted)	1 : 3·4	15·6	1·9	48·7	66·1	87
Brewers' grains, wet ..	1 : 3·5	3·5	1·5	8·6	12·7	17
Malt culms	1 : 3·6	11·4	1·1	38·6	38·7	51
Cereals, Rich in Starch, not Rich in Protein or Oil.						
Barley, feeding	1 : 8·0	8·0	2·1	57·8	67·9	89
Oats, English	1 : 8·0	7·2	4·0	47·4	59·7	79
Oats, Argentine	1 : 8·0	7·2	4·0	47·4	59·7	79
Maize, American	1 : 11·5	6·7	4·5	65·8	81·0	107
Maize, Argentine	1 : 11·3	6·8	4·5	65·8	83·5	110
Maize meal	1 : 13·0	5·5	3·5	63·9	77·8	102
Wheat middlings, fine ..	1 : 4·8	13·2	3·0	53·8	72·0	95
Wheat middlings, coarse or sharps	1 : 5·1	13·8	4·3	50·5	64·0	84
Wheat pollards	1 : 4·5	11·6	4·0	51·6	60·0	79
Wheat bran	1 : 4·7	11·3	3·0	45·0	49·7	65
Wheat bran, broad ..	1 : 4·7	11·3	3·0	45·4	48·1	63
Locust bean meal	1 : 22·1	4·0	0·7	69·2	71·4	94

Pigs can, however, be fed during the winter partly on roots. Sows will suckle their litters and keep in health without either meal or slop if fed as follows: *Morning and evening*—cut roots mixed with ground palm kernel cake or maize germ meal; *Mid-day*—A meal of dry cake, half linseed, half palm kernel.* They should be gradually accustomed to this diet.

Young pigs will require meal when they are weaned, but after a short time they will grow well on cut roots and finely-ground palm kernel cake. They can be finished in about six weeks on a mixture of seven parts of the finest wheat offals and one part of palm kernel cake or linseed cake.

Dairy Cow Feeding: The Need for Economy in Milk Production.

THE outlook for the dairy farmer is uncertain and calls for a serious consideration of ways and means. On the one hand he is confronted with maximum prices for his milk, on the other, with decreased supplies and high prices of concentrated feeding stuffs for the winter season. Whilst it is probably true that no one can teach the skilful dairy farmer much about the possibilities of economy in feeding his cows, it is to be feared that there are many others who are not yet adequately informed as to what can be done in this direction. Especially in the use of concentrated feeding-stuffs is it necessary that past practice should be subjected to the most careful revision, and the Food Production Department would urge upon every dairy farmer the importance of giving the closest consideration to this point.

Where concentrated feeding-stuffs are used to any extent economy in their use is essential just now if the dairy farmer would keep the cost of production at a figure which will allow of a profit being made; it is equally essential in the national interest if the available supplies are to go as far as they should. There was much talk and writing about the over-feeding of dairy cows in the days when cakes and meals were abundant and cheap; and some of this talk and writing was well founded. Such excessive use was wasteful then; it is doubly unwise and reprehensible now.

Dairy farmers as a whole have realised painfully the increase in the cost of cakes when making their recent purchases;

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* See p. 721.

but it is doubtful if the possible effect of due economy in their utilisation has been equally realised in every case. What this effect may be can be briefly and strikingly illustrated.

When cakes and meals could be purchased at an average price of £7 per ton, a decrease in the daily allowance per cow of 2 lb. (say from 8 lb. to 6 lb.), only reduced the cost of the ration by 1½*d.* per day. Assuming that the yield of the cow was two gallons daily on the average, this would of course represent a saving of only three-farthings in the cost per gallon of milk. But nowadays, with cakes and meals averaging say £18 13*s.* 4*d.* per ton—the cost may be higher, but this is an approximate figure suited to easy calculation—a decrease of 2 lb. in the daily ration means a reduction in the feeding cost of 4*d.* per day, equal to 2*d.* per gallon of milk. Such a saving may very well in certain instances make all the difference between a fair profit on the milking herd and no profit at all, or even a loss. It is certain that in many cases where dairy farmers still adhere to the system of feeding practised in pre-war times a reduction of 2 lb of concentrated food per cow daily would not affect the daily yield of milk, whilst affecting materially the cost of production. The question can be very simply tested in each individual case. The matter is one of urgency and importance. Dairy farmers, therefore, are earnestly advised by the Food Production Department to find out at once exactly the amount of cake and other concentrated foods that are being given to their cows, and to devote the most careful attention to all possible economies in this connection, consistent with the maintenance of the milk supply.

Notes on Manures in November.
From the Rothamsted Experimental Station, Harpenden, Herts.

DURING the forthcoming season the prices of sulphate of ammonia, superphosphate and compound manures are to be fixed, so that the farmer knows precisely where he will stand in the matter of expenditure on fertilisers. The prices are :—

For sulphate of ammonia : £15 15*s.* per ton before 31st December, £16 7*s.* 6*d.* afterwards.*

For superphosphate : 30 per cent. grade, £6 10*s.* per ton in December, with a reduction of 1*s.* per month for each month before December and a rise of 1*s.* per month from January till May, 1918.†

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* See *Journal*, June, 1917, p. 372.
† See *Journal*, September, 1917, p 686.

These prices are for net prompt cash, and include delivery in bags to consumers' stations.

The Food Production Department, in conjunction with the Ministry of Munitions, has come to an arrangement with makers of basic slag in regard to maximum prices to be charged by them.*

The prices for compound manures will shortly be issued.

As regards other fertilisers, great efforts are being made to ensure supplies of lime and basic slag. Naturally there are considerable difficulties to be overcome, but the farmer who places his orders early may reasonably hope to obtain delivery of sufficient fertilisers.

So far as the farmer is concerned his object is substantially what it was last year. He is called upon to produce as much food as possible, in spite of difficulties and of adverse circumstances. The use of proper fertilisers increases crops more readily and with less expenditure of labour than any other single method, and unquestionably constitutes one of our greatest aids at the present time.

General Notes.—The general outline of manurial operations at present is :—

1. Farmyard manure can be drawn out and applied to the land whenever convenient. If, however, it is to be clamped, as is generally best in the North, provision should be made for sheltering the heap from rain. Numerous experiments have proved that exposure causes considerable loss of crop-producing power, even more than is shown by analysis.

2. Root land that has suffered from finger-and-toe, and clover crops or seeds leys that do not promise very well, should receive a dressing of lime or ground chalk.

3. Arrangements should be made to secure sufficient sulphate of ammonia to give a dressing to all corn crops that have not been well manured. One cwt. of sulphate of ammonia applied to an acre of land may reasonably be expected to give an extra sack of corn per acre—a quantity sufficient to supply all the bodily needs of one man for 100 days.

Buy Sulphate of Ammonia early.—Even where it is not proposed to use the sulphate of ammonia till spring there are great advantages in buying early. Not only is there a saving of price but when the material is safely on the farm it can be used as soon as needed. It is a great mistake to apply sulphate of ammonia too late in spring; better results may be expected from early than from late applications. There is no need to fear that sulphate of ammonia will not keep; considerable misapprehension exists on this point. If the sulphate of ammonia is in a reasonably dry condition when it is sent out from the works, and if it is stored in a dry shed, it keeps indefinitely. At Rothamsted it is regularly stored from one year to another without loss or ill effect.

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* See *Journal*, August, 1917, p. 580.

Lime and Waste Lime.—One of the great aids to crop production in the present circumstances is lime, which can be applied in the form of lime, ground lime, burnt lime, ground limestone, chalk and various waste limes.

Lime in any of these various forms not only increases certain crops; it has on the soil an even more important effect, the value of which it is difficult to over-estimate. By improving the texture of the soil it considerably lightens the work of cultivation on heavy land, and it often ensures a crop of clover where otherwise there might be failure. Here it is of the greatest importance that it should be used whenever necessary. An increase in the supplies of the various forms of lime is very desirable, both by fuller development of natural deposits and by the more complete utilisation of the waste lime and chalk obtained during many manufacturing processes. Waste materials necessarily have to be purchased on analysis, and waste lime and chalk are no exception, but so long as they contain a reasonable amount of true lime or of calcium carbonate, are free from harmful substances and are sufficiently dry to be applied conveniently to the land, they can advantageously be utilised on the farm.

At the present time waste chalk or limestone can be put on seeds leys to help the clover, or it can be stored in readiness to go on swede or turnip land where finger-and-toe is prevalent. This disease is, as is well known, checked by lime or chalk.

Army Manure.—The basis of any scheme of manuring must be farmyard or stable manure, and if, as often happens, farmyard manure is not available in sufficient quantities, the deficit must be made up by purchasing from outside. Wherever army manure is to be obtained at a reasonable rate it should be purchased; during wet weather there may often be opportunities of carting and clamping it. Clamping is very desirable in the case of all purchased stable manure so as to kill the weed seeds brought in, and which may cause considerable trouble afterwards.

Use of Superphosphate.—Superphosphate is generally reserved for the root crops, but it is advantageously applied to grain in the following circumstances :—

1. Where the sowing has been delayed for some reason and it is desirable to get the plant well established before winter.

2. Where the weather at harvest time is apt to be uncertain. A dressing of superphosphate may hasten the ripening processes and thus bring on the harvest earlier.

3. Where the preceding crop has been folded off by sheep which have also received cake. In this case superphosphate not only helps the crop to stand up better but it also ensures more complete utilisation of the manurial residues of the cake and the crop fed off.

Flue Dust as a Source of Potash.—During the present season a certain amount of flue dust will be obtainable as a potassic fertiliser. Like other waste products this is variable in composition. The grades available contain 3 to 11 per cent. of potash (K_2O). Deleterious substances, such as cyanides, sulpho-cyanides, zinc, etc., are sometimes present, and these might have an adverse effect on the young crop. The possibility of harm is much diminished by early application, and if the dust is put on in autumn there is little reason to fear bad effects so long as excessive amounts of harmful substances are not present.

High-grade and Low-grade Basic Slag.—The price of basic slag for the season 1917–18 has now been fixed by agreement with the makers, and the results are published in a leaflet issued by the Food Production Department (F.P. 105).* It will be observed that citric soluble phosphates only are quoted by some firms and total phosphates by others. It is therefore difficult to make a strict comparison between these slags, but the following general rules will be found useful (like all other fertiliser rules these are subject to exceptions) :—

1. There is no special virtue in a rich slag apart from its lower cost of grinding, bagging and freight per unit of phosphate; a large dressing of slag, low in phosphate, has commonly given as good a crop increase as a smaller dressing of slag rich in phosphate.

2. Slags of high solubility generally act more quickly on young plants than slags of low solubility.

3. The value of this beneficial effect on the young plant depends on subsequent conditions. If the season is moist

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* See *Journal*, August, 1917, p. 580.

and not too hot, so that there is a long growing period, crops grown on low-solubility slag may catch up those grown on high-solubility slag. This was shown in the Devon experiments with swedes, the Northumberland experiments with hay, and some of the Essex experiments. On the other hand, where the growing period is shorter the advantage of the early start given by high-soluble slag may be maintained to the end; this is shown in the Saxmundham experiments, and in some of the Essex experiments, *e.g.* at Stapleford Abbots. Where he has the choice the farmer would no doubt be well advised to buy the high-grade, high-soluble slag if its price per unit were the same as that of the low-grade, low-soluble slag, but where he has not the choice he must be prepared to use the low-grade slags.

THE following Note has been communicated to the Board by Mr. A. T. Johnson, of Troed-y-Rhiw, North Wales:—

Runner Ducks as Farm Layers.

It has often been contended—and, indeed, proved by actual test—that a good strain of laying ducks is more profitable than hens to the average farmer when egg-production is the main object. There are many reasons why this should be so. In the first place ducks can better withstand extreme cold than ordinary fowls, and this means that, as layers, they are not so easily checked during winter. They are also much less prone to disease, require less attention, are more easily satisfied in the matter of diet and housing, and remain in a condition of prolificacy to a far greater age than does the average hen.

General Characteristics.—The Indian Runner duck is the greatest layer of all waterfowl. Flocks of this breed from a good strain will often average a higher egg-production than hens of selected quality, and most of the eggs will be produced in the winter months. Being great foragers for natural food, Runners are more at home on a farm than anywhere else and, given the opportunity, they will roam far and wide the whole day long, and for the greater part of the year practically keep themselves. Feeding is thus reduced to a minimum, and pasture and arable land derive great benefit from such inveterate destroyers of noxious insect pests.

Another important point must not pass unnoticed in regard to this useful little duck. Many farmers say that they will not keep waterfowl because they foul the cattle's drinking water. This is very true in many instances and with most breeds, but the Runner is curiously unlike the remainder of its genus, since it prefers to roam the fields rather than to dabble about in pond and stream. A few years ago a farm was rented by the writer upon which the water supply had to be rigorously conserved. Yet the flocks of Indian Runners, which occupied colony houses about the fields, seldom gave any trouble in this respect. These ducks do not possess the same instinct for water and boggy land as others. They can, indeed, be kept in perfect health with nothing more than an ordinary vessel for drinking purposes, and swimming water is not essential to the successful fertilisation of the eggs.

Housing.—One of the first essentials to the success of keeping Runner ducks for egg-production on farms is good housing. It is bad practice to allow the stock to lead a makeshift life, if an abundant supply of eggs is required. The birds should be given a dry, well-littered floor, and they should be closed in at night. At least one side of the house should consist of open wire netting, and it is necessary to erect a temporary fence of the same material round the sleeping-place. In this improvised pen the flock must remain until about 10 a.m, and there the birds may be given water and their first feed of the day. If this precaution is not taken many eggs will be laid away and lost. All breeds of ducks lay, as a general rule, before the hour stated.

Egg Laying.—The eggs of the Indian Runner are rather smaller than those of the other breeds, and generally white or cream in colour. A good duck will lay all the year round, with brief intervals, commencing in her first autumn at the age of six months, and continuing in profit until she attains her fourth or fifth year. In individual cases the ducks will often lay longer than that. Indeed, one should not consider a Runner to be at her best until she is at least two-and-a-half years old, though, naturally, individuals vary very considerably. For general purposes the eggs of this wonderfully prolific breed usually fetch rather a higher price than hens' eggs, for they are not only larger but, being entirely free from that strong or "ducky" flavour common to the average duck's egg, they are used for precisely the same purposes as the former.

Variety.—There are several varieties of Indian Runner ducks, the fawn-and-white being perhaps the most reliable. The whites, however, have often proved themselves remarkable layers, and they possess the advantage on the farm that they can more easily be seen. This latter feature is worth considering in some circumstances, but Runners, though they are such keen foragers, and long-distance wanderers, rarely fail to return to their house at dusk. Some of the writer's flocks would roam half-a-mile away, but they were always at home before night-fall.

Recipe for Bottling Chickens.

IN the autumn, as young cockerels become fit for killing and hens cease to lay, the preservation of table chicken by a simple process of bottling provides a most economical means of dealing with the produce. There are many systems in vogue; more than one recipe is given in some of the up-to-date cookery books, and a most interesting account of the Canadian method appeared in *Poultry* for 17th August, 1916; but, perhaps, there is no more convenient system than the following, communicated by Captain Peirson Webber, Director of the National Service Poultry Club:—

Recipe.—Prepare as for roasting, then dismember and take the head, neck, back, legs, feet, gizzard, etc., and the ugly bones of the wing to be boiled down to chicken jelly, which may be bottled and used for soup. Next, take the white meat cutlets, the jointed legs and the livers, and steam for about 20 minutes till sterilised; then, while still steaming hot, place the cutlets in one set of bottles, the jointed legs in another set of bottles and the livers in a third set, all of which are part full of sterilised water, to which one teaspoonful of table-salt has been added for every pint used. Keep the sterilising kettle or pan at a temperature ot 198° to 212° F. for 40 to 60 minutes, and close down with patent stoppers.

Where patent stoppers are not available, glass jam jars can be used, in which case bottles are filled with chicken jelly stock in place of water, and sealed down with melted fat and a paper cover. All must be sterilised most carefully, and the result will be equally good.

Further particulars may be had from the Secretary, N.S.P.C., Ettington Manor, Stratford-on-Avon.

Grease-banding of Fruit Trees.[*]

MUCH loss of fruit is due to the damage done by the caterpillars of the winter moth. The loss caused by these insects may in a large measure be prevented. One of the chief means of prevention consists in grease-banding, which should be carried out during September, or, at latest, before the middle of October.

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[*] Food Production Leaflet No. 12.

All *standard* apple, pear, plum and cherry trees should be banded with some suitable sticky preparation to catch the female moths which would otherwise crawl up the trunks and lay their eggs on the stems and branches.

Female winter moths and also females of certain other moths which appear between October and April are wingless and if the bands are kept in good condition during this period the insects will be caught and the danger of a plague of caterpillars next year will be much reduced.

Banding is neither difficult nor expensive. The materials required are stout paper (grease-proof paper is best), string and some form of banding preparation.

Paper for Grease-banding may be bought in strips 6 to 9 in. wide, or it may be obtained in sheets and cut into strips of that width.

To band the tree, take a strip amply long enough to encircle the trunk at a distance of 3 ft. from the ground. Fit it closely round the trunk and tie it tightly in position by means of string. It is best to make two ties, one at 1 in. below the upper edge of the paper, and the other at a similar distance above the lower edge.

If, as often happens in the case of old trees, the surface of the trunk is so irregular that a paper band cannot be made to fit tightly round it, the banding preparation may be put directly on the bark. In that case, however, the preparation must not be oily, for if it were the tree would be damaged.

Grease-banding Preparations.—There are on the market various preparations which give thoroughly satisfactory results, and those intending to grease-band should purchase the material from a reputable firm of sundries-men. A good grease-banding material should stick well, cling to the paper and should contain no pungent oil.

Although a good preparation remains sticky for some months, it must be scraped or rubbed from time to time so as to expose a fresh surface.

Cart grease should not be used.

The material should be spread upon the paper by means of a piece of wood, or by one of the implements sold for the purpose, and should cover the upper two-thirds of the band.

In spreading, take care that the grease is not smeared on the bark.

Inasmuch as the winter moth frequently lays its eggs on the branches of forest trees, it is advisable, wherever possible, to grease-band any forest trees which may be in the immediate neighbourhood of the orchard.

Stakes used to support the fruit trees should also be treated.

Bush trees may also be banded if there is sufficient length of main stem to allow of the band being placed high so as to avoid its being splashed with earth during heavy rains. If the main branches are near the ground and are not too numerous they may also be banded.

THE following Note has been communicated by Mr. G. B. Berry, General Inspector of the Horticulture Branch of the Board:—

The Cultivation of Peas with Potatoes.

In the early part of 1917 expert evidence on Belgian methods of catch-cropping and inter-cropping* was given before the Cultivations Sub-Committee of the Technical Division of the Board. The experts who were examined all recommended, amongst other crop associations, the cultivation of peas with potatoes by planting a single seed at the side or in the centre of each potato plant. According to the evidence the pea would grow rapidly and, if the right variety were selected, would dominate over the potato and produce a useful crop without in any way interfering with the growth of the potato plant or the general tillage operations necessary for its successful culture.

There seemed to be some possibility of introducing a new and useful type of crop association in England and experiments were accordingly made at various centres. The varieties of peas used were Little Marvel, Pilot, and Thomas Laxton; a single pea was inserted at the side of each potato plant as soon as its position in the row could be defined. The trials were carried out at the following centres: The Allotments, West Ealing; Plas Newydd Gardens, Anglesey; Rudgwick Fruit Farm, Sussex; Cottage Gardens, Bucks Green, Sussex; Swanley Horticultural College.

In every case the combination of peas and potatoes was a real failure. The potato haulms suppressed the peas completely; few or no pods were formed, and where a few did form scarcely a single pod contained any seeds. In one case where the peas were put in the drill along with the seed potato the result was equally disappointing.

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* See *Journal*, September, 1917, p. 646.

It is quite clear that peas will not grow in an ordinary potato crop in England. Possibly on the Continent the potato does not produce so much haulm and the pea has a better chance of reaching the sun and air.

Agricultural Work for Convalescent Soldiers in France.*

As early as October, 1914, in a convalescent home established in connection with the Grand-Lebrun Hospital at Bordeaux, a few wounded soldiers were put through a course of graduated agricultural labour before being sent back to duty. The experiment turned out exceedingly well and was gradually extended, for it was found that the results obtained in bringing injured parts of the body back into use and in making the patients ready for military life compared very favourably with those recorded in other hospitals where the men are given indoor treatment with electricity, massage, etc.

The convalescent home is situated at Martillac in the midst of a vine-growing district. It has accommodation for 120 men and receives drafts from the Bordeaux Hospital once a week. On arrival the patients are examined and assigned to the class of work specially suited to them. Four grades of "validity" are recognised, the fourth and highest being complete recovery; on attaining the fourth grade the men go back to duty. Patients sent to Martillac and classed in the first grade go to work at once, but only on land within a radius of 1 kilometre (.6 of a mile) from their quarters, and return for dinner in the middle of the day as well as in the evening so that they can be carefully watched by the doctor; they may be kept on the grounds of the Home itself or sent to farmers who apply for them. Second-grade men are distributed to farmers at a distance of one to two kilometres from the Home; they leave early in the morning and return at night, and take their mid-day meal with their temporary employer. Finally a third grade of patients go still further afield. These are boarded out to the more distant farmers from Monday to Saturday and return to headquarters each week-end for a medical examination.

All the men irrespective of their grade are paid at the uniform rate of 1 franc (9½*d.*) per day by their employers, but it must be borne in mind that the farmers to whom the second- and third-grade men are allocated also provide a part or the whole of the soldiers' board. Special stress is laid on the fact that the Home is not a source of cheap labour, but has been established primarily for the patients' benefit, and all employers are expected to remember this. A couple of non-commissioned officers act as inspectors and travel over the district on bicycles, reporting each evening to headquarters any complaints they have received either from the soldiers or from the farmers. On the whole the system works very smoothly and both employers and employees are satisfied.

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* *Comptes Rendus des Séances de l'Académie d'Agriculture de France*, Vol. III. No. 16, p. 435 (1917).

Out of a total number of 1,159 patients who received the agricultural treatment between October, 1914, and April, 1917, only 10 per cent. have been discharged as unfit for military duty, while 74 per cent. have been completely cured. They have furnished no less than 30,000 days of work, which have been distributed amongst 121 farmers with most excellent results to the agriculture of the district.

The Utilisation of Straw.

IN a Memorandum on the Utilisation of Straw, Dr. J. F. Tocher, Consulting Chemist to the Highland and Agricultural Society of Scotland, estimates that in view of the proposed agricultural programme of the Board of Agriculture for Scotland some 420,000 tons of straw may be produced in 1918 over and above the amount usually grown in that country. Dr. Tocher points out that straw can replace esparto grass satisfactorily in the manufacture of paper and that it could doubtless be employed on a large scale for making the strawboards used in ordinary bookbinding. He recommends, further, that after supplying the needs of farmers, papermakers and strawboard makers, any surplus straw should be used (1) for making a digestible fodder by the soda process, and (2) as an agent to promote the growth of nitrogen-fixing organisms in the soil.

OFFICIAL NOTICES AND CIRCULARS.

Agricultural Wages Board.

THE Board of Agriculture and Fisheries have issued Provisional Regulations (as set out below) with respect to the constitution and proceedings of the Agricultural Wages Board for England and Wales, and they will shortly proceed to the appointment of the Wages Board.

In addition to the Central Wages Board, District Wages Committees will be set up throughout England and Wales, each comprising an equal number of representatives of employers and workers, respectively, and also one or more impartial persons appointed by the Board of Agriculture and Fisheries. These Committees will have to make recommendations to the Central Board as to the rates of wages applicable to their districts.

As will be observed from the Provisional Regulations the representative members on the Central Board will be partly elected by organisations representing farmers and labourers, respectively, and partly nominated by the Board of Agriculture and Fisheries.

The President will be glad to receive and consider suggested names of representatives of employers, submitted by farmers' organisations, or by groups of at least ten farmers, and of representatives of workers, submitted by labourers' organisations, or by groups of at least ten agricultural labourers. From among the persons so suggested nominated representative members of the Central Board and of the District Committees will be selected. All suggestions of names, together with the full postal addresses of the persons suggested, should be forwarded at an early date to The Secretary, Board of Agriculture and Fisheries, 80, Pall Mall, S.W.1. Members of the Central Board and of District Committees will be entitled to an allowance in respect of out-of-pocket expenses.

A Memorandum giving fuller details of the provisions of the Act relating to minimum rates of wages may be obtained post free on application at the address given above.

The following are Provisional Regulations with respect to the Constitution and Proceedings of the Agricultural Wages Board (England and Wales), set up under the Corn Production Act, 1917:—

IN pursuance of the provisions of Part II. of the Corn Production Act, 1917, and of Section 2 of the Rules Publication Act, 1893, the Board of Agriculture and Fisheries hereby certify that on account of urgency the following Regulations with respect to the constitution and proceedings of the Agricultural Wages Board (England and Wales) should come into immediate operation, and accordingly make the following Regulations to come into operation forthwith as Provisional Regulations :—

1. An Agricultural Wages Board shall be established for England and Wales consisting of 39 persons, of whom seven shall be appointed members and the remainder representative members. The representative members shall be members representing employers and workmen, respectively, in equal proportions.

2. The Chairman and Deputy Chairman shall be appointed by the Board of Agriculture and Fisheries from among the members of the Wages Board, and each of them shall (provided that he continues to be a member of the Wages Board) hold office for such period as the Board of Agriculture and Fisheries may determine.

3. The appointed members shall be such persons as may be selected by the Board of Agriculture and Fisheries to act on the Wages Board, provided that at least one shall be a woman.

4. The selection and appointment of representative members shall, subject to the provisions of paragraph 5 of these Regulations, be as follows :—

Of the members representing employers, eight shall be elected as follows :—

2 representatives by the Council of the Royal Agricultural Society of England.

2 representatives by the General Executive Committee of the National Farmers' Union.

2 representatives by the Council of the Central and Associated Chambers of Agriculture.

2 representatives by the Welsh Agricultural Council.

Eight members representing employers shall be nominated by the Board of Agriculture and Fisheries, after due consideration of any names which may be submitted by agricultural associations or otherwise, and after such local enquiries as the President of the Board may deem desirable.

Of the members representing workmen six shall be elected by the Executive Committee of the National Agricultural Labourers' and Rural Workers' Union and two by the General Executive Committee of the Workers' Union. Eight members representing workmen shall be nominated by the Board of Agriculture and Fisheries, after consultation with the Ministry of Labour, and after due consideration of any names submitted by workmen and their representatives.

5. In the election and nomination of representative members, regard shall be had so far as practicable to securing on the Wages Board a fair representation of all classes of farming, and of the various conditions of employment in agriculture in all parts of the country. Where, as the result of any elections under the provisions of paragraph 4, such fair representation cannot, in the opinion of the Board of Agriculture and Fisheries, be secured on the Wages Board, the Board of Agriculture and Fisheries may, in addition to the persons nominated by them under paragraph 4, nominate a representative member in place of any person so elected.

6. The Board of Agriculture and Fisheries may, notwithstanding the provisions of paragraph 1, if they think it necessary to secure the proper representation of any classes of employers or workmen, after giving the Wages Board an opportunity to be heard, nominate additional representative members of the Wages Board to serve for such period, not exceeding three years, as may be determined by the Board of Agriculture and Fisheries. The number of such additional representative members shall always be an even number, not exceediug four in all, of whom half shall be representatives of employers and half shall be representatives of workmen.

7. Any member representing employers who becomes a workman in agriculture shall vacate his seat. Any member representing workmen who becomes an employer in agriculture shall vacate his seat. The question of fact shall in each case be determined by the Board of Agriculture and Fisheries.

8. Any representative member who, in the opinion of the Board of Agriculture and Fisheries, fails without reasonable cause to attend one-half of the total number of meetings in a calendar year shall vacate his seat.

9. If in the opinion of the Board of Agriculture and Fisheries any representative member shall be incapable of acting as a member of the Wages Board, the Board of Agriculture and Fisheries may determine his appointment and he shall thereupon vacate his seat.

10. At the end of one year from the date of the establishment of the Wages Board five representative members to be chosen by lot from among the members representing employers and five representative members to be chosen by lot from among the members representing workmen (in each case excluding additional representative members nominated under paragraph 6 of these Regulations) shall retire from the Wages Board.

11. At the end of two years from the date of the establishment of the Wages Board five representative members to be chosen by lot from among the members representing employers and five representative members to be chosen by lot from among the members representing workmen (in each case excluding additional representative members nominated under paragraph 6 of these Regulations and excluding members filling the vacancies created by the operation of paragraph 10) shall retire from the Wages Board.

12. The term of office of an appointed member shall be two years, and, subject to the provisions of paragraphs 6, 7, 8, 9, 10 and 11, the term of office of a representative member shall be three years, provided that—

(*a*) A member appointed to fill a casual vacancy shall sit only for the unexpired portion of the term of office of his predecessor; and

(*b*) A seat rendered vacant by effluxion of time shall, in the event of delay occurring in filling it, be temporarily occupied by the retiring member until a successor is appointed.

13. Any person vacating his seat on the Wages Board under any of the preceding paragraphs or for any other reason otherwise than under paragraph 9 of these Regulations shall be eligible to be re-appointed as a member of the Wages Board.

14. A vacancy among representatives members shall be filled in the same manner as in the case of the original appointment to the vacated seat.

15. Every member of the Wages Board shall have one vote. If at any meeting of the Board the number of members present representing employers and workmen, respectively, is unequal, it shall be open to the side which is in the majority to arrange that one or more of their members shall refrain from voting, so as to preserve equality. Failing such an arrangement, the Chairman, or, in his absence, the Deputy Chairman, may, if he thinks it desirable, adjourn the voting on any question to another meeting of the Board. The Chairman, or, in his absence, the Deputy Chairman shall, in the event of an equal division, have a second or casting vote.

16. The expressions "agriculture" and "workmen" in these Regulations shall have the meanings given in Section 17 (1) of the Corn Production Act, 1917.

17. The Wages Board shall be known under the title of "The Agricultural Wages Board (England and Wales)."

18. Any question upon the construction or interpretation of these Regulations shall in the event of dispute be referred to the Board of Agriculture and Fisheries for decision.

Given under the Official Seal of the Board of Agriculture and Fisheries this twenty-eighth day of September in the year one thousand nine hundred and seventeen.

A. D. HALL, *Secretary.*

THE following Circular Letter, dated 29th September, 1917, has been addressed by the Food Production Department of the Board to the Chairmen of Agricultural Executive Committees:—

Motor Tractor Scheme.

SIR,—1. During the last few weeks I have held an inquiry into the working of the Motor Tractor Scheme throughout the country. I have conferred with a number of Machinery Sub-Committees, all the District Commissioners appointed by this Department, a number of Tractor representatives, and I have also met all the Tractor Supervisors. As a result I have come to the conclusion that, while, broadly speaking, the Scheme is working in most parts of the country as well as can be expected in view of its novel and experimental character and the difficulties that have had to be encountered, certain modifications need to be made.

2. In order to carry out these changes, and especially in view of the impending large deliveries of tractors and other implements, I have decided to strengthen the existing Departmental organisation dealing with this work both at Headquarters and in the country. The "Machinery and Implement Section" of this Department has accordingly been expanded and renamed the "Mechanical Cultivation Division," and will be in future under my immediate control. The work of the Division will be separated into two main sections, each of which will be administered by a director. Lieut.-Colonel E. W. Allen, who has been responsible for framing the Tractor Scheme, will now superintend its practical operation and will be the new Director of the organisation in the country. Lieut.-Colonel H. M. Stobart (Lord Durham's principal agent) will be the new Director of the organisation at Headquarters.

3. Colonel Allen is leaving London at once with a view to conferring with each Executive Committee and Machinery Sub-Committee on the working of the Scheme in the county. I hope that each Committee will place before Colonel Allen particulars of any difficulties they are experiencing in carrying out the Tractor Scheme, whether these be due to the inefficiency of any of the officials appointed for this purpose or to the nature of the Scheme itself. Colonel Allen is under instructions to report to me as to the efficiency of the Departmental organisation in each county, and, if his visits are to achieve the object for which they are being made, it will be necessary for the Committees to give him the fullest information, and I trust that you will be able to make arrangements for this to be done.

4. With the arrival of large numbers of additional tractors the Scheme will assume such magnitude that it is necessary to arrange at once for more control being undertaken by the Committees. The original intention was that units of eleven tractors (ten working and one under repair) should be formed, each under the control of one Supervisor. The experience which has already been gained in the working of this Scheme indicates that it will be desirable to have a more elastic arrangement as to the number of tractors in each unit, and, should your Executive Committee so recommend, the Department will be prepared, as soon as sufficient tractors are available for this purpose, to arrange for each District Committee to have a unit allocated to its own area without insisting on each unit necessarily consisting of eleven tractors. As already indicated in the Circular

Letter sent out yesterday,* the Department will be prepared to consider the appointment of Supervisors upon the recommendation of your Machinery or District Sub-Committees. In this way it is hoped to secure the services of competent men who will possess the confidence of the District Committees and be procurable at a lower rate of salary.

5. It is hoped that as the Tractor Scheme develops it will be possible to arrange for a small District Machinery Sub-Committee to be set up for each of the areas covered by the existing District Sub-Committees, and by this means the Department hope to secure more local interest in the working of the Scheme, and more effective supervision of the labour employed.

6. One of the principal results of the inquiry which I have just concluded is to establish the fact that the most frequent cause of breakdowns on the part of the tractors has been that they have been set to work on quite unsuitable land. The agricultural tractor at its present stage of development is the least reliable of all ploughing instruments, and to reserve for it the most difficult tasks, and to set it to work on the stiffest, roughest, or most hilly land, is not merely uneconomical but certain to produce breakdowns. It is realised that with only one Machinery Officer for each county it has probably been impossible to arrange for the inspection of every field selected for tractor ploughing. Is is hoped, however, that members of the District Machinery Sub-Committee will be able to undertake this work. A separate communication is being addressed to each Executive Committee with regard to the kinds of land which should be selected for tractor ploughing†, and the work to be entrusted to District Machinery Sub-Committees will be more fully dealt with in that letter.

7. It is requested that, in future, all communications with regard to the Tractor Scheme shall not be addressed to any officer of the Department by name, but to "The Director-General," and I am arranging to deal personally with every question involving the consideration of policy or organisation. It will be impossible for some time for Colonel Allen to visit every county in England and Wales, but should your Committee experience any special difficulty in carrying out the Scheme I hope that you will at once communicate with me, and I will arrange for him to pay a special visit to your county as soon as possible and report to me.

8. A duplicate of this letter is enclosed for the information of your Machinery Sub-Committee, and further copies will be sent to you on application.

I am, etc.,
ARTHUR LEE, *Director-General.*

THE following Circular Letter, dated 3rd October, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees:—

Selection of Land for Tractor Ploughing.

SIR,—With reference to the Director-General's Circular Letter of the 29th September,‡ in which it is suggested the Agricultural Executive Committees should set up a District Machinery Sub-Committee for each of the areas covered by the existing District Sub-Committees, I am directed to say that it is desired that your Executive Committee should arrange for its Machinery Sub-Committee and District Committees, in making contracts for Tractor Ploughing, to be guided by the following principles :—

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* Not here printed. † See below. ‡ See above.

Hitherto, tractors have in numerous instances been given a task which they could not efficiently perform; the most difficult land has not infrequently been selected for tractor work and the easier tasks have been left for horses to perform. The results have, in such circumstances, been disappointing. It must be remembered that the agricultural tractor is still in an experimental stage. Types have been developed which are well suited for dealing with ordinary agricultural land; but makers have not yet succeeded in producing machines which, while suited for general purposes, may safely be set to the rough work involved in breaking up certain types of old pastures. Tractors should not be used for ploughing land in which boulders and large stones occur; the inevitable results are breakages and delays; neither should they be used on land where, from springs or broken drains, there are boggy patches. In a recent case which came under the notice of the Department, a tractor, set to work on land of this description by a District Committee in the end of July, sank into the wet soil and was out of action for several weeks. This is no doubt an extreme case, and the Committee would claim that the unusual weather of August could not have been foreseen; but even if tractors do not become "bogged," they are very liable to be strained when set to work on land of this description. A third type of land, frequently met with, on which tractors should not be used is a clay soil on which thorns and other bushes have been allowed to grow. Even after the bushes have been stubbed many roots remain, and these are certain to cause breakages.

Tractors must not be used in reclaiming heath-covered moorlands. These are likely to contain boulders and boggy patches and are certain to contain the tough roots of old heather, which would soon damage implements designed to cultivate land which had already been reclaimed.

Tractors are quite suitable for ploughing ordinary grass land provided the soil is free from boulders, wet patches and thorn roots, and land laid down within the past half-century is usually easily ploughed to a depth of 5 in. to 6 in. when free from these obstructions. The older pastures are often set up in very high-backed "lands," and these are much better tackled by horses than by the tractor plough.

Representations have been made to the Department that trouble has arisen from the demand made by farmers for deep ploughing. This is a subject that wants careful handling. As a rule, there is a proper depth for ploughing each class of land, which the farmer in his own interests will not desire to exceed; but this proper depth might subject certain types of tractor to strains for which they were not designed. The danger of injury in stubbles and other recently tilled soils is remote; but in grass land, which has not been broken for many years, there is a considerable risk of over-straining the tractor or plough. As a rule Committees should not accept contracts to plough grass land to a greater depth than 6 in., but in deep silty soil, when preparing land for potatoes, this depth may be exceeded. The depth in ploughing stubbles should not exceed 8 in.; but here, again, in deep loamy soils a greater depth may be permissible.

In consequence of the rise in the price of fuel, in wages, and in other costs in connection with tractor work, it is found that the previous minimum charge of 15*s*. an acre for tractor ploughing cannot be maintained, and in future no contracts must be made at a lower charge than 20*s*. an acre. These charges should apply to land of ordinary quality where the furrow does not exceed 6 in. in depth in the case of grass, and 7 in. in the case of stubble, or fallow land. For each additional inch in depth an extra charge of not less than 2*s*. 6*d*. per acre should be made; an extra charge should also be made for ploughing very small or irregular fields likely to give rise to loss of time, and for any exceptional circumstances involving greater cost. The Department will be glad to receive the observations of your Committee on the scale of charges suggested above. It is recognised that local variations in the scale may be called for, but it is obviously desirable that, so far as possible, there should be uniformity in the scale of charges for work of the same kind done in different parts of the country.

I am, etc.,
H. L. FRENCH, *General Secretary*.

THE following Circular Letter (F.P. 119) dated 18th September, 1917, has been addressed by the Food Production Department of the Board to owners of threshing tackle:—

Soldier Labour for Owners of Threshing Tackle.

1. This Department is now in a position to supply soldiers to owners of threshing tackle who are short of labour, and who are willing to train men so that their tackle may be kept fully manned.

2. The men selected for training will be men with previous experience of agricultural work, or who are intelligent, strong, active and willing to work long hours (if necessary), or any men who have been accustomed to agricultural engines or other agricultural machinery, steam road rolling or hauling engines. In the first instance the men must be paid a wage of 25s. which, if they make proper progress, must be increased at the end of the first month and again when the men have become thoroughly proficient.

3. All threshing tackle owners in need of skilled men are urged to apply at once to this Department for men to be allotted to them for training under this scheme, so that no machines may remain idle for want of labour.

4. The Department will be prepared to approach the War Office for leave to be granted to skilled men now on military service in this country who are not in Category A or employed in the Mechanical Transport Section of the Army Service Corps, who are required to keep threshing machines fully manned, on being furnished with the full name, number, unit and present address of the men whose services are required. No guarantee, however, can be given that any men can be granted furlough, and owners should, wherever possible, apply for men suitable to be trained under the above scheme. It will not be possible for the Department to approach the Military Authorities for the release for this work of men who are overseas, unless they are in the Labour Corps.

5. Owners of threshing tackle are recommended to arrange to employ a gang of 4 or 5 soldiers to travel with each threshing machine from farm to farm in order to avoid the serious dislocation which otherwise occurs owing to so many farm hands being taken from their ordinary work

on the arrival of the threshing machine. Application for such soldiers should be made to the Agricultural Executive Committee for the county, who have been instructed to assist owners of threshing tackle with the selection of suitable men. Soldiers so employed would have to be employed for at least one month, and paid the customary wage for the class of work, but in any case not less than 25*s*. a week.

THE following Memorandum (F.P. 118), dated 17th September, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees:—

Scheme for Short Courses of Training for Soldiers made Available for Agricultural Work.

1. Schemes are contemplated for the training of—

(*a*) Tractor drivers,
(*b*) Steam plough or threshing tackle men, and
(*c*) Horse ploughmen.

2. It has been found that many of the so-called skilled men now being sent to Distribution Centres for work in connection with the 1918 programme have little or no previous experience of farm work, but a considerable proportion of them possess other experience which will enable them to be quickly trained for various branches of work connected with the new programme. A careful examination of each man is therefore essential on his arrival at the Centre, as although a man may not be a skilled ploughman, he may, by judicious selection and a short course of training, be made of value for some branch of farm work. Amongst the unskilled soldiers, also, men will be found who are suitable for a course of training.

In making a selection of the men non-commissioned officers should be assigned as far as possible for tractor or steam plough work, as with the higher wages paid for this class of work they will not lose by their transfer to agriculture.

3. The Department suggest that the Labour Sub-Committee should be entrusted with the carrying out of this scheme, and that the labour officer should keep a card index on which each man should be recorded, and grouped according to his previous experience and qualifications.

4. Amongst the so-called skilled men, there may be a residue of soldiers who, after the most careful consideration are judged both by the Commandant and the Department's Commissioner to be quite unsuitable for allocation for any branch of farm work. In such cases the Commandant will obtain authority from Command Headquarters for the men to be sent back.

5. (*a*) *Tractor Drivers.*—The men most suitable for training for tractor work will be, as a rule, men of the Mechanical Transport Section of the Army Service Corps, or men engaged in the motoring or engineering trades previous to enlistment. The Department's Commissioners have already been instructed to see that such men are reserved, and to select from them or other suitable candidates for training as tractor drivers about 12 men for each county.

6. The tractor representative will be asked to prepare a list of the tractor drivers under his charge in the county who are sufficiently skilled to be capable of training other men in both driving and ploughing, and to submit the list to the Labour Branch of the Food Production Department. The Department will subsequently arrange for the tractor representative to take over the men selected.

7. The selected men should be trained in both ploughing and tractor driving. Under normal conditions the course of training should not extend beyond a fortnight.

8. (*b*) *Steam Plough and Threshing Tackle Men.*—The men most suitable for this employment will be those who have had previous experience in agricultural work, or who are intelligent, strong, active, and willing to work long hours (if necessary), or any men who have been accustomed to agricultural engines or other agricultural machinery, steam road rolling or hauling engines. In the first instance the men will receive a wage of 25*s*., which, if they make proper progress, will be increased at the end of the first month, and again when the man has become thoroughly proficient. Thus, for a satisfactory man, good wages are guaranteed. For a commencement, District Commissioners will select the six most suitable men from among the soldiers sent to each distribution centre, sending a list to the Labour Branch of this Department. On receipt of this list the Department will arrange through the Steam Cultivation Development Association, and Threshing Tackle Owners, for the training of these men, so that all steam ploughing and threshing tackle may be kept fully manned.

9. (*c*) *Horse Ploughmen.*—Among the soldiers will be found many men who have had long experience of the management of horses in towns, but who lack agricultural knowledge. These men, after being taught to plough, etc., could be entrusted with the working of a team of horses. In some of the heavy-land counties it is the custom to have a boy or second man when three or four horses are worked as a plough team, so that under the procedure which the Department propose for training, the Committee may recoup some of the cost by making such charge as is usual in the case of a ploughboy or ploughman's mate. Where such custom does not prevail the whole expense will fall upon the Department.

10. In some cases skilled ploughmen in charge of Government horses could be selected to give the course of training; but it will also be open to the Committee to make arrangements with some of the best farmers who have ploughing work in progress to have men taught by their own ploughmen. Under normal conditions the period of training should not extend beyond 14 days.

11. An alternative arrangement that has already been adopted by several Committees is to secure suitable land within easy reach of the Distribution Centre to be ploughed free of cost to the farmer. In this case one or two competent ploughmen would be required to act as instructors, and the requisite number of horses can be obtained for the purpose by the Committee, under the Horse Scheme F.P. 92[*], as well as ploughs, if these cannot be borrowed.

12. The Executive Committee's representative will be responsible for the selection of soldiers to be trained as horse ploughmen.

13. Where a man is being trained with one of the gang-ploughmen, or by a ploughman employed directly by the Committee, the ploughman may be paid a bonus of 5*s*. for each man taught. When the training is given by a farmer, he may be allowed the free services of the men undergoing training for ordinary farm work when ploughing cannot be done.

14. **Rates of Pay.**—It is obviously an advantage to the unskilled man to be trained in order that he may subsequently secure a higher

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[*] See *Journal*, August 1917, p. 575.

rate of wage, and it is also advisable to offer some further monetary inducement to such men to become proficient in the shortest possible time. The Department have therefore arranged that whilst any man is undergoing training in horse ploughing or tractor driving, and has to live away from his Military Depot, he shall be paid only 21*s*. per week (living-out rate), but when he is able to show proficiency in the work he shall be paid a bonus of 10*s*., and thereafter be secured employment at the full rate of wage. Payments to men training for horse ploughing will be made by the Executive Committees out of grants issued to them by the Department, and to men training for tractor drivers by the tractor representative.

Where soldiers are being trained in the vicinity of the Distribution Centre, returning to barracks each night and still remaining under military control, they will receive only their military pay during the period of training, but will be entitled to the 10*s*. bonus on passing the proficiency test.

15. **Proficiency Test.**—The Department propose furnishing Committees with short leaflets to be handed to the soldiers undergoing training for horse ploughing, indicating the principal points on which they should acquire information during their course of training.

16. In the case of men trained for tractor work, in order to secure that they have become proficient in driving and ploughing, the Department would be glad if Committees would nominate their Machinery Officer and one practical farmer to examine the men at the end of their 14 days' training. The Machinery Officer should arrange with the Tractor Representative as to the time and place at which the men should be examined. As regards soldiers trained for horse ploughing Committees should nominate one of their members or officials or other competent person to examine the men at the end of their 14 days' training. If, in the opinion of the Committee's nominees, a man is sufficiently advanced to enable him to be employed forthwith in the particular branch of work for which he has been trained, the Committee should grant him a certificate of proficiency. A supply of certificates will be forwarded to Committees in due course.

17. If it is considered that a further week's training is essential before the soldier can become proficient arrangements should be made for this to be given. On the other hand, if it is thought that the man is not likely to prove satisfactory even with this additional training, he should be returned to the Distribution Centre, no bonus being payable in these circumstances.

Exemption from Military Service for Men Employed on Fruit Farms.

THE following Memorandum (F.P. 83(*b*)), dated 17th September, 1917, has been addressed by the Food Production Department of the Board to the Secretaries of the Agricultural Executive Committees, and to the Board's representatives before the Appeal and Local Tribunals:—

1. With reference to this Department's Memorandum, F.P. 83,* of the 18th July last, in paragraph 1 of which it is stated that the expression "whole time employed on a farm on farm work" does not include work on a poultry farm or a market garden for the production of flowers or of fruit, it is

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* See *Journal*, August, 1917, p. 569.

desired to notify all concerned that the word "fruit" in that paragraph is intended to include only luxury fruit such as grapes, peaches, etc.

2. If the market garden on which a man is employed is mainly utilised for producing vegetables and other crops of an amount and character to constitute national importance, the fact that a portion of the garden is devoted to fruit suitable for jam, or that part of the holding is an orchard, does not take the man out of the arrangement applicable to men employed whole time on a farm on farm work provided that the whole time of the individual whose case is under consideration is devoted to the cultivation of the part of the garden which produces crops of national importance.

3. Agricultural Executive Committees may also issue vouchers to particular individuals whole time engaged on large farms in producing fruit for jam.

4. The War Office concur in the terms of this Memorandum, and are arranging to issue an Army Council instruction dealing with the matter.

5. **Issue of Vouchers where Cases are referred to Agricultural Executive Committees by the Tribunals.**—It has been represented to this Department that in some cases Agricultural Executive Committees delay dealing with cases which are referred to them by the Tribunals in accordance with the Local Government Board Memorandum R. 144.

6. It has now been arranged that if the Tribunal does not receive a voucher confirming the man's claim to be whole time employed on a farm on farm work of national importance within three weeks of the date on which the case is referred by the Tribunal to the Committee, the Tribunal will proceed to deal with the case on its merits, and any voucher subsequently issued by the Committee will be of no effect, and will not be recognised by the military authorities.

THE following Order (No. 949), dated 13th September, 1917, was made by the Food Controller:—

PART I.—DEFINITION AND RESTRICTIONS.

The Potatoes Order, 1917.*

1. In this Order:—

A "Wholesale Dealer" means a person for the time being authorised under this Order to sell potatoes by wholesale.

A "Retail Dealer" means a person for the time being authorised under this Order to sell potatoes by retail.

The "Food Committee" means in respect of any area in Great Britain the Food Control Committee established for the area pursuant to the Food Control Committee (Constitution) Order, 1917, and in respect of Ireland the Food Control Committee appointed for Ireland by the Food Controller.

"Seed Potatoes" means potatoes grown in Scotland or Ireland in the year 1917, or grown in England or Wales in the year 1917 from seed grown in Scotland or Ireland in the year 1916, which will pass through a riddle having a 1⅝-in. mesh, and will not pass through a riddle having a 1⅛-in. mesh.

"Ware Potatoes" means potatoes which will not pass through a riddle having a 1⅝-in. mesh.

The expression "his own potatoes" with reference to a grower of potatoes means the potatoes grown by such grower.

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* The substitutions of dates, provided for by The Potatoes (Postponement of Date) Order, 1917 (No. 998), have been made in this Principal Order.

2. Ware potatoes which are fit for human food shall not be sold or offered for sale or bought for any purpose except for seed or for human food.

3. Except where a grower is selling under the authority of clause 44 of this Order no person shall on or after the 15th September, 1917, sell or buy potatoes otherwise than by weight.

4. Except a grower selling his own potatoes no person shall after the 7th October, 1917, sell potatoes by wholesale either on his own account or as agent on commission unless he is entitled to and has applied for registration as a wholesale dealer, or by retail unless he is entitled to and has applied for registration as a retail dealer under Part II. of this Order, and except a grower selling his own potatoes, no person shall after the 31st October, 1917, sell potatoes by wholesale either on his own account or as agent on commission unless he holds a certificate of registration as a wholesale dealer under Part II. of this Order for the time being in force or by retail unless he holds a certificate of registration as a retail dealer under Part II. of this Order for the time being in force. Provided that this clause shall not prevent a wholesale dealer from selling direct to consumers in quantities of not less than 1 cwt.

5. No person other than the grower thereof shall on or after the 15th September, 1917, sell seed potatoes or sell potatoes as or for seed unless he holds a certificate of registration as a dealer in potatoes for seed under Part II. of this Order.

6. After the 31st October, 1917, a retail dealer (unless registered as a hawker or costermonger) shall not sell potatoes by retail except at a place in respect of which he holds a certificate of registration as a retail dealer, but this shall not prevent a retail dealer from selling from his cart in the ordinary course of his business. A retail dealer registered as a hawker or costermonger shall sell only from his cart, stall or barrow, and at such other place if any as may be named in his certificate.

7. A grower of potatoes shall not on or after the 15th September, 1917, sell or offer for sale his own potatoes (being sound marketable ware potatoes of the 1917 crop) at a price below the lowest or minimum price fixed by Part III. of this Order, and no person shall on or after the same date buy or offer to buy any such potatoes from the grower at a price below the same price; provided that this clause shall not apply to sales in quantities of less than 1 cwt.

8. A grower or retail dealer shall not on or after the 15th September, 1917, directly or indirectly sell or offer or expose for sale any potatoes of the 1917 crop (other than seed potatoes) at prices above the maximum prices authorised by Part III. of this Order in relation to sales by growers and retailers respectively, except for actual delivery before the 1st October, and a wholesale dealer shall not sell or offer to sell any such potatoes at such a price as to infringe the provisions of Part III. of this Order restricting the profits of wholesale dealers.

9. No potatoes shall after the 30th September, 1917, pass through the hands of more than two wholesale dealers between the grower and the retail dealer, and, accordingly, all persons concerned shall on and after the 1st October, 1917, observe the rules in relation to wholesale dealings contained in the First Schedule to this Order.

10. On and after the 1st October, 1917, and until further notice from the Food Controller, no sound marketable ware potatoes of the following varieties shall be sold or otherwise dealt with (except by the grower

for his own consumption) without the licence of the Food Controller, namely :—" King Edward," " Arran Chief," " Langworthy," " What's Wanted," and " Golden Wonder," and every grower shall comply with any general or special direction that may be issued by or on behalf of the Food Controller prohibiting the removal of sound marketable ware potatoes of any other variety from the premises of the grower. The prohibition contained in this clause shall not apply to potatoes grown by a grower whose whole acreage of potatoes of all varieties in 1917 has not exceeded 1 acre.

PART II.—REGISTRATION.

11. Every person who or whose predecessor in business was on the 1st January, 1916, and now is dealing in potatoes by wholesale as a regular part of his business shall be entitled, on making application pursuant to this Order on or before the 8th October, 1917, to receive a certificate of registration as a wholesale dealer in potatoes.

12. (*a*) Every person who or whose predecessor in business was on the 1st January, 1916, and who is now dealing in potatoes by retail as a regular part of his business shall be entitled, on making application pursuant to this Order on or before the 8th October, 1917, to receive a certificate or certificates of registration as a retail dealer in potatoes in respect of the premises at which at the date of this Order he is carrying on such business or as a hawker or costermonger as the case may be.

(*b*) A retail dealer who carries on his business (including the selling of potatoes by retail) at more than one shop or place shall be entitled on making the proper applications to receive a separate certificate of registration in respect of each such shop or place. Sales in quantities of 1 cwt. and upwards direct to consumers by a person whose business is substantially wholesale shall not for the purpose of this clause be deemed to be sales by retail.

(*c*) A hawker or costermonger shall be so described in his certificate.

13. The Food Committee shall not refuse a certificate of registration applied for by a person entitled to receive the same under the foregoing provisions except with the consent of the Food Controller and in circumstances in which the Food Committee might have revoked the certificate if it had been already granted. Upon the refusal of a certificate the applicant's title (if any) shall cease.

14. Any applicant for registration whether as a wholesale or as a retail dealer may include in his application an application for registration as a dealer in seed potatoes and any application for registration may be made in respect of seed potatoes only, but the Food Committees shall have full discretion as to granting or refusing every such application and any certificate of registration granted in respect of seed potatoes may so far as it relates to seed potatoes be revoked by the Food Committee at any time at its discretion and shall be revoked if the Food Controller so directs.

15. The Food Committee for any area or the Food Committee in Ireland, may in any case in which in their opinion it is desirable so to do in the interest of the public within their area with the consent of the Food Controller grant to any other person a certificate of registration either as a wholesale dealer or as a retail dealer in respect of any premises within their area or as a costermonger or hawker and, unless they see any good reason to the contrary they shall without any such consent grant an appropriate certificate to every applicant who has

served in the Forces of the Crown during the present war and before so serving was carrying on business as a wholesale or retail potato dealer within their area.

16. Every application for a certificate of registration shall be made on a form to be prescribed by the Food Controller, and every applicant shall furnish upon such form a true statement of the particulars required for completing the form, which statement shall be signed by the applicant or his duly authorised agent.

17. Every application in Great Britain shall in the case of a wholesale dealer be made to the Food Committee for the area in which his only or principal place of business at the date of this Order is situated and in the case of a retail dealer (other than a hawker or costermonger) to the Food Committee for the area in which his premises are situated at the date of this Order (in cases where the retail dealer is applying in respect of premises situated in more than one area separate application being made in each area in respect of the premises situated therein) and in the case of a hawker or costermonger to the Food Committee for the area in which he resides at the time of such application. In Ireland every application shall be made to the Food Committee as that Committee may direct.

18. A person duly entitled may receive certificates of registration both as a wholesale dealer and as a retail dealer on making due application in both capacities.

19. A grower of potatoes shall not be entitled to receive a certificate of registration merely by reason of his having sold his own potatoes whether by wholesale or by retail but he shall be qualified to receive appropriate certificate if on the 1st January, 1916, he or his predecessor was and he now is as a regular part of his business dealing in potatoes other than those grown by him.

20. Every certificate of registration shall be in the form prescribed by the Food Controller.

21. The Food Committee may with the consent of the Food Controller revoke any certificate of registration if they are satisfied that any of the provisions of this Order or regulation or direction made or given by or under the authority of the Food Controller relating to potatoes has not been observed by the holder of such certificate or any of his servants or agents, and shall revoke such certificate if required so to do by the Food Controller.

22. The Food Committee shall keep a register of the persons to whom, and the premises in respect of which certificates of registration have been granted under this Order.

23. In the event of the transfer of any business in connection with which a certificate of registration is held, or in the event of the death of the holder of a certificate of registration, it shall be lawful for the transferee or other person claiming under the holder of such certificate, on making an application for a certificate of registration, to sell and deal in potatoes from the date of such application until the decision thereon is intimated by the Food Controller, in the same manner and subject to the same conditions as the holder of such certificate was entitled to deal by virtue thereof.

24. The holder of any certificate of registration, his servants and agents, shall give to the Food Committee such information, reports and returns relating to his stocks of potatoes and dealings in potatoes as the

Food Controller or Food Committee may from time to time require, and shall produce all books, documents and accounts relating thereto for inspection on lawful demand.

25. Every certificate of registration as a wholesale dealer shall be kept by the holder at his only or principal place of business, and every certificate of registration of a retail dealer shall be kept at the premises to which the same relates, or in the case of a hawker or costermonger shall be carried with him wherever engaged in selling potatoes, and every certificate shall be produced by the holder on lawful demand.

PART III.—PRICES.

26. The lowest or minimum price at which potatoes of the 1917 crop (being sound marketable ware potatoes) may be sold by the grower thereof on or after the 15th September, 1917, shall be £6 per ton, but this provision shall not apply upon a sale of any quantities of less than 1 cwt.

27. As respects every sound crop of potatoes, the grower shall cause the ware potatoes to be dressed out so that they may be sold separately at not less than the authorised lowest price.

28. The highest or maximum prices at which potatoes of the 1917 crop, other than seed potatoes, may be sold by the grower thereof shall be £6 10*s*. per ton. Except that a grower of potatoes may sell quantities of less than 1 cwt. to consumers at a price not exceeding 1*d*. per lb.

29. The foregoing minimum and maximum prices are fixed on the basis (i) that the potatoes are either loaded by the seller into trucks at the seller's railway station, or (at the buyer's option) into a ship or barge not less convenient to the seller than the seller's railway station, (ii) that bags (if required) are supplied by the buyer, and (iii) that no commission is paid. If the potatoes are delivered otherwise than as above, a corresponding variation shall be made in the price and in particular if bags are supplied by the grower, the above-mentioned minimum and maximum prices shall each be increased by a sum of 5*s*. whether the bags are returnable or not, and if any commission is paid by the grower to a wholesale dealer not exceeding the rate authorised by Clause 32 the minimum and maximum prices shall each be increased by the amount of the commission.

30. Upon a sale of his own potatoes by a grower, it may be made a condition of the sale that the buyer supplies any labour required for lifting or otherwise handling the potatoes, or undertaking the carriage of the potatoes from the seller's premises to station, ship, barge or other place of delivery. Provided that by the contract of sale a fair value is placed upon the services so agreed to be rendered by the buyer, and in any such case the value so agreed shall be deemed, for the purposes of this Order, to form part of the price paid by the buyer for the potatoes.

31. The foregoing provisions in relation to sales by a grower are subject to the special provisions contained in the First Schedule hereto in case where the grower is also a wholesale dealer, and such provisions shall be observed by all persons concerned accordingly.

32. (*a*) No wholesale dealer shall, in the week ending 6th October, 1917, or in any succeeding week sell potatoes, other than seed potatoes,

except at such prices as secure that the aggregate of the prices charged for potatoes so sold during the week in question does not exceed the cost to him of such potatoes by more than an amount representing 7*s*. 6*d*. for every ton of potatoes so sold

(*b*) No wholesale dealer shall after the 30th September, 1917, sell potatoes other than seed potatoes as agent on commission at a commission exceeding 7*s*. 6*d*. per ton.

33. The cost of potatoes to a wholesale dealer for the purpose of the preceding clause shall be reckoned as including the following items and no more, viz :—

(*a*) The price actually paid or payable or by virtue of Clause 30 deemed to have been paid by him for the potatoes, including the authorised charge for bags where the potatoes are bought by him already bagged ;

(*b*) A sum not exceeding 5*s*. per ton for bags where the potatoes are bought by him unbagged and bags (whether returnable or not) are supplied by him ;

(*c*) Any reasonable costs of transportation (including marine insurance) or cartage borne by him in respect of the potatoes ; and

(*d*) Any market charges or port dues paid or payable by him in respect of the potatoes.

34. Every wholesale dealer shall keep accurate records containing such particulars as may be necessary for showing whether or not he is complying with the foregoing provisions of this Order and shall make such returns as to his wholesale trade in potatoes as may from time to time be required by the Food Controller or by the Food Committee for any area in which he has a place of business. All such records and relevant documents shall be produced by the dealer on lawful demand.

35. Where a wholesale dealer carries on business in different places the requirements of Clauses 32 and 34 of this Order shall be satisfied in respect of the transactions at each of his places of business separately.

36. The highest or maximum prices which may be charged by a retail dealer on a sale of potatoes shall (except as may be otherwise determined for any area by the Food Committee) vary according to the prices actually paid for the potatoes by the retail dealer and shall be in accordance with the scale set out in the Second Schedule hereto, provided that this clause shall not apply to seed potatoes or to potatoes sold as seed by a dealer authorised to deal in seed potatoes.

37. The cost of potatoes to a retail dealer for the purpose of the preceding clause shall be reckoned as including the following items and no more, viz. :—

(*a*) The actual price paid for the potatoes by the retail dealer ;

(*b*) Any sums actually paid or payable for the carriage of the potatoes by the retail dealer except the carriage of the potatoes from the place at which in the ordinary course of business potatoes would be delivered to him.

38. A retail dealer if he is ready and willing to sell potatoes over the counter at prices not exceeding the maximum prices applicable under this Order may in addition to the foregoing prices make such charges as may be agreed between him and the purchaser, or the delivery

of potatoes ordered for delivery at the purchaser's premises, not exceeding *2d.* for any quantity not exceeding one stone with a further penny for each further half stone or part of a half stone so delivered, such payment to cover any charge for the giving the usual credit in respect of the sale.

39. Where potatoes of which the cost to the retailer is different are mixed for sale the scale of maximum prices for the mixture shall be the scale applicable to the potatoes the cost of which is lowest.

40. Every retail dealer shall so long as he shall have any potatoes on sale display prominently at the shop or other place of sale (including his cart, stall or barrow, if he is a hawker or costermonger) a statement or statements showing the prices at which he is selling the potatoes at such shop or place, and when he is selling different potatoes at different prices the statement or statements shall be in such a form or shall be so displayed as to show clearly which are the prices for each lot.

41. Every retail dealer shall keep an account in which he shall regularly and punctually and at the earliest practicable time enter the particulars of all his purchases of potatoes showing the description of potatoes purchased, the quantity purchased, the price paid or payable for the potatoes, and all sums (if any) paid or payable for the carriage of the potatoes, and he shall in the same account enter the prices per stone, per half stone, and per lb. at which he has sold the potatoes or is offering them for sale, and he shall preserve for not less than three months all invoices, bills, receipts, and other documents relating to his purchases of potatoes, and he shall on lawful demand produce such account and all such invoices, bills, receipts, and other documents for inspection, and point out which entries in his account and which of the invoices, bills, receipts, or other documents relate to the potatoes which he has on sale at the time of the demand, and give such other information as to his dealings in potatoes as the person making such demands shall reasonably require.

42. A Food Committee may from time to time by resolution vary the scheduled scale of maximum prices for potatoes sold by retail within their area or any part of such area or fix a standard maximum price for all kinds of potatoes or standard maximum prices for sound and damaged or undersized potatoes or for different qualities of potatoes, but—

(*a*) Every such resolution shall be reported to the Food Controller within seven days, and shall not take effect (i) in the case of a resolution reducing any scheduled maximum price until three days after it shall have been so reported or such later times as the Food Controller may direct, and (ii) in the case of a resolution increasing a scheduled maximum price or fixing any standard prices until the same has been sanctioned by the Food Controller ; and

(*b*) Every resolution of a Food Committee under this clause shall be subject at any time to review by the Food Controller, and shall be withdrawn or varied as he may direct.

43. Wherever upon any sale of potatoes the seller supplies and is entitled to charge for bags, he may, if the bags are of such quality and in such condition as to be reasonably capable of being used again, require a deposit to be paid by the buyer of not exceeding *1s. 6d.* for each bag,

in addition to the sum charged for the use of the bag, which deposit shall be refunded upon the return of the bag in such condition as is reasonable having regard to its condition when supplied and to ordinary wear and tear in use. Where a buyer is a wholesale dealer he may on re-sale of the potatoes require the amount, if any, of the deposit paid in relation thereto to be re-imbursed to him by the buyer of the potatoes, who shall in that event have the like right as his vendor would have had to repayment of the deposit upon a return of the bags.

44. A grower may sell his potatoes in the ground by auction or otherwise to a wholesale dealer but in every such case the buyer of the potatoes so sold shall be deemed for all the purposes of this Order to be the grower thereof and the terms of this Order shall apply to any such potatoes subject to the following variations, namely :—

(*a*) The minimum price upon subsequent sales by the person who is deemed to be the grower shall be £6 7*s*. 6*d*. per ton in lieu of £6 per ton, and

(*b*) On every sale of such potatoes by him he shall be deemed to sell as a wholesale dealer and not as a grower.

PART IV.—SUBSIDIARY AND MISCELLANEOUS PROVISIONS.

45. Whenever potatoes which are not sound marketable ware potatoes are sold by or on behalf of a grower at prices less than the minimum price for sound marketable ware potatoes the potatoes so sold shall be expressly sold and invoiced as "undersized potatoes" or as "damaged potatoes" or as "undersized and damaged potatoes" with the addition (if the parties think proper) of any further particulars of the damage and any such potatoes shall not be sold either by a wholesale dealer or by a retail dealer except under the same description with or without any such addition as aforesaid, and any retail dealer who exposes any such potatoes for sale shall show by a notice prominently displayed in connection with such potatoes the description of such potatoes as above

46. No potatoes which are not sound marketable ware potatoes shall be mixed by any grower or wholesale or retail dealer with any potatoes which are sound marketable ware potatoes

47. Nothing contained in this Order or either of the Schedules to this Order shall prevent accommodation sales from one retail dealer to another retail dealer but the purchasing dealer shall not sell potatoes so purchased by him at prices higher than those at which the selling dealer might have sold them and the purchasing dealer shall upon every such accommodation sale take from the selling dealer a note of the transaction showing the scale of highest prices at which the selling dealer might have sold.

48. A grower of potatoes shall not knowingly deliver to the purchaser thereof in connection with any sale of potatoes or to any other person for the use or benefit of the purchaser or by his directions, a greater quantity of potatoes than the quantity paid or agreed to be paid for by the purchaser or agree to give more than the usual credit or make or agree to make any remission or rebate, or return of purchase money or pay or offer to pay any commission or make or offer to make any gift in money or in kind unless, after deduction of the amount or value of the rebate commission or gift, the purchase price paid upon such sale

amounts to or exceeds the appropriate minimum price according to the foregoing provisions; and no person shall propose to a grower of potatoes or invite him to do any act or thing which would constitute an infringement of this clause.

49. No person shall, in connection with the sale or disposal or proposed sale or disposal of any potatoes, enter or offer to enter into any fictitious or artificial transaction, or make or demand any unreasonable charge.

50. Whenever in this Order or any Schedule hereto any person is required to produce any documents or class of documents, or give any information on lawful demand, he shall produce or give the same at all reasonable times and places on demand of any officer or constable of police, or any person authorised by the Food Controller or Food Committee to make such demand either particularly or as holding any office or position, and either generally or in the particular case.

51. Infringements of this Order are summary offences against the Defence of the Realm Regulations.

52. Nothing contained in this Order shall prejudice or affect any contract entered into before the date of this Order for the sale of potatoes not being potatoes of the 1917 main crop varieties.

53. This Order shall not apply to cooked, dried or evaporated potatoes.

54. (*a*) This Order is without prejudice to the Seed Potatoes (Immune Varieties) Order, 1917.*

(*b*) The Potatoes 1916 Main Crop (Prices) Order (No. 2), 1917,† and the 1917 Crop (Restriction) Order, 1917,‡ so far as not already revoked are hereby revoked without prejudice to any proceedings in respect of any contravention thereof.

First Schedule.

Rules for restricting wholesale dealings and adjusting the terms of the Order to the case of wholesale dealers who are also growers or retail dealers.

1. In this Schedule :—

"Grower-dealer" means a grower of potatoes who is also a wholesale dealer.

"Wholesale and retail dealer" means a person who is a wholesale dealer and also a retail dealer.

2. A wholesale dealer shall not re-sell to or through the agency of another wholesale dealer (whether or not such other dealer is also a retail dealer) any potatoes which he has himself bought or agreed to buy from a wholesale dealer or from a grower-dealer selling either as a wholesale dealer or through a wholesale dealer on commission.

3. Every wholesale dealer shall keep the potatoes which he is at liberty to re-sell to a wholesale dealer separate from those which he is not at liberty so to re-sell, and shall keep separate accounts in relation

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* See *Journal*, September, 1917, p. 689.

† See *Journal*, March, 1917, p. 1281.

‡ See *Journal*, August, 1917, p. 482, and September, 1917, pp. 675, 684.

to the two classes of potatoes, and shall cause his accounts to be kept in such a form as to show clearly from which class the potatoes delivered upon each sale made by him have been taken.

4. A wholesale and retail dealer may as respects any potatoes bought by him treat the purchase (and enter the same in his books) as made by him for the account of his retail trade, or transfer any part of a purchase at cost price to the account of his retail trade. In every such case the potatoes so dealt with shall be disregarded in applying the provisions of Clause 32 of this Order, and the transaction shall be dealt with in the account relating to the dealer's retail trade as if he had not been also a wholesale dealer.

5. A wholesale and retail dealer may also and in the alternative treat any potatoes as sold by his wholesale business or department to his retail business or department at any price and on any terms which would have been permissible under this Order as between him and a retail dealer buying such potatoes from him and in that case:—

(*a*) In the application of Clauses 32 and 34 of this Order the potatoes shall be treated as having been sold by the dealer at that price and on those terms in the course of his wholesale business; and

(*b*) In determining the maximum prices that may be charged for the potatoes on the sale thereof by retail such potatoes shall be treated as having been purchased by the dealer at that price and on those terms in the course of his retail business.

6. A grower-dealer may sell his own potatoes either as a grower or as a wholesale dealer, but he shall be deemed to sell as wholesale dealer unless he expressly sells as the grower.

7. Where a grower-dealer sells his own potatoes as grower the sale shall be subject to the provisions applicable under this Order to a sale by a grower.

8. Where a grower-dealer sells his own potatoes as a wholesale dealer the sale shall be subject as respects price and conditions of sale to the provisions applicable under this Order to a sale by a grower except that the maximum price shall be increased by the sum of 7*s* 6*d*. per ton and by any reasonable costs of transportation (including marine insurance) or cartage, and the amount of the market charges and port dues (if any) incurred by the vendor in relation to the potatoes sold over and above the charges which would have been included in the maximum prices applicable if the sale had been made by him as grower.

9. Sales of his own potatoes made by a grower-dealer as a wholesale dealer shall in his account be kept separate from any other sales made by him, and shall not be taken into account for the purpose of Clause 32 of this Order.

10. For the purpose of this Schedule every sale of potatoes in excess of 1 ton to a single purchaser not being a public institution or body or otherwise known to be a large consumer shall be deemed to be a sale to a wholesale dealer unless it is proved that in fact—

(*a*) The purchaser is not a wholesale dealer; and

(*b*) The purchaser is either a retail dealer or purchases the potatoes for his own consumption.

Second Schedule.

SCALE OF MAXIMUM RETAIL PRICES

Retailer's Buying Price per cwt for Potatoes delivered at the place at which he ordinarily takes delivery	Highest Authorised Retail Selling Price over the Counter		
	Rate per Stone of 14 lb for Potatoes Sold in Lots of 14 lb or upwards	Rate per ½ Stone of 7 lb for Potatoes Sold in Lots of 7 lb or upwards, but less than 14 lb	Rate per lb for Lots of less than ½ Stone
	s *d*	*d*	*d.*
Any price up to and including 3*s* 3*d* ..	0 7	3½	½
Exceeding 3*s* 3*d* but not exceeding 3*s*. 7*d*	0 7½	4	¾
„ 3*s* 7*d* „ „ 3*s* 11*d*	0 8		
„ 3*s*. 11*d* „ „ 4*s* 2*d*	0 8½	4½	
„ 4*s* 2*d* „ „ 4*s* 6*d*	0 9		
„ 4*s* 6*d* „ „ 4*s* 9*d*	0 9½	5	
„ 4*s* 9*d* „ „ 5*s* 1*d*	0 10		
„ 5*s* 1*d* „ „ 5*s* 4*d*	0 10½	5½	1
„ 5*s* 4*d* „ „ 5*s*. 8*d*	0 11		
„ 5*s* 8*d* „ „ 5*s* 11*d*	0 11½	6	
„ 5*s* 11*d* „ „ 6*s* 3*d*	1 0		
„ 6*s* 3*d* „ „ 6*s* 7*d*	1 0½	6½	
„ 6*s* 7*d* „ „ 6*s* 11*d*	1 1		
„ 6*s* 11*d* „ „ 7*s*. 2*d*	1 1½	7	
„ 7*s* 2*d* „ „ 7*s* 6*d*	1 2		
„ 7*s* 6*d* „ „ 7*s* 10*d*	1 2½	7½	1¼
„ 7*s* 10*d* „ „ 8*s* 1*d*	1 3		
„ 8*s* 1*d* „ „ 8*s* 5*d*	1 3½	8	
„ 8*s* 5*d* „ „ 8*s* 8*d*	1 4		
„ 8*s* 8*d* „ „ 9*s* 0*d*	1 4½	8½	
„ 9*s* 0*d*	1 5		

NOTE —The grower's minimum price for sound marketable ware potatoes being £6 per ton the maximum retail prices below 1*s* per stone will apply only to damaged or undersized potatoes

Two Orders (Nos. 965 and 1009), dated 20th September and 2nd October, 1917, respectively, have been issued by the Food Controller to the effect that :—

The Butter (Maximum Prices) Orders (Nos. 2 and 3), 1917.

Pursuant to Clause 1 (*a*) of the Butter (Maximum Prices) Order, 1917,* the Food Controller hereby prescribes maximum prices at the rates set forth in the schedules hereto as the first-hand prices for the several varieties of butter mentioned in such schedules upon all sales of butter by or on behalf of the importer or maker thereof, for delivery on or after the 24th September and the 2nd October, 1917, respectively.

SCHEDULE OF FIRST-HAND PRICES (24th SEPTEMBER).

French Fresh Rolls	*ex port*	26*s*.	per doz. lb
„ Paris (unsalted)	„	238*s*.	„ 112 „

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* See *Journal*, September, 1917, p. 678.

SCHEDULE OF FIRST-HAND PRICES (2nd OCTOBER).

	Per 112 lb. s.	d.	
Australian (*ex port*)	206	0	
New Zealand ,,	208	0	
Argentine .. ,,	206	0	
Canadian .. ,,	206	0	
American .. ,,	206	0	
Irish Creamery—			
56 lb. boxes f.o.r.	224	0	net.
28 lb. boxes and casks .. ,,	225	0	,,
Kegs .. ,,	226	0	,,
Rolls or bricks (1 or 2 lb.). ,,	238	0	,,
Rolls, bricks, or prints (½ lb.). ,,	242	8	,,

	Per 112 lb. s.	d.	
Irish Factory or Farmers' Butter in original packages:—			
56 lb. boxes f.o.r.	220	0	net.
28 lb. boxes and casks .. ,,	221	0	,,
Kegs .. ,,	222	0	,,
Rolls or Bricks (1 or 2 lb.) ,,	234	0	,,
Rolls, bricks or prints (½ lb.) ,,	238	8	,,
Irish Farmers' Lump Butter .. ,,	210	0	,,
British-made butter (*ex* creamery, factory or farm) ,,	230	0	
Rolls or bricks (1 or 2 lb.) .. ,,	244	0	
Rolls, bricks or prints (½ lb.) ,,	248	8	

NOTE.—The above prices are all for salted butter. If unsalted 3*s*. per cwt. extra in each case.

		s.	*d.*	
French fresh rolls	(*ex port*)	26	0	per dozen lb.
,, Paris unsalted	,,	238	0	per 112 lb.
Blended butter, English factory, delivered:—				
Rolls and bricks (1 or 2 lb.)		25	0	per dozen lb.
Rolls and bricks (½ lb.)		25	3	,,
Prints (½ lb.)		25	9	,,

The first-hand prices for French and blended butters are the same, whether salted or unsalted.

Except where the price is stated as a net price, discount shall be allowed at 2*d*. in the £ for cash within seven days, and at 1*d*. in the £ for cash within one calendar month.

AN Order (No. 1005), dated 1st October, 1917, has been made by the Food Controller to the effect that:—

The Cheese (Maximum Prices) Order No. 2, 1917.

Pursuant to Clause (1) (*a*) of the Cheese (Maximum Prices) Order, 1917,* the Food Controller hereby prescribes as the first-hand prices for the several varieties of cheese mentioned in the first column of the Schedule hereto, maximum prices at the rates set forth in the second column of the same Schedule upon all sales of such cheese by or on behalf of the maker thereof, for delivery at any time during the month of October,

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* See *Journal*, September, 1917, p. 677.

1917, and at the rates set forth in the third column of the same Schedule upon all sales of such cheese by or on behalf of the maker thereof for delivery on or after the 1st November, 1917.

THE SCHEDULE.

Variety of Cheeses.	*First-Hand Prices for Delivery in October.*	*First-Hand Prices for Delivery on or after 1st November, 1917.*
Wensleydale and similar makes, ripened.	1*s*. 7*d*. per lb.	1*s*. 7*d*. per lb.
Stilton, ripened	1*s*. 7*d*. ,,	1*s*. 7*d*. ,,
Any whole milk cheese not exceeding 2 lb. weight uncut.	1*s*. 6*d*. ,,	1*s*. 6*d*. ,,
Caerphilly	124*s*. per cwt. of 112 lb.	129*s*. per cwt. of 112 lb.
All other whole milk cheese.	142*s*. per cwt. of 112 lb.	142*s*. per cwt. of 112 lb.
Partially skimmed (British).	120*s*. per cwt. of 112 lb.	125*s*. per cwt. of 112 lb.

In all cases prices are *ex* factory or *ex* farm, and include delivery as customary.

All these prices are subject to the following terms, namely :—

For cash within seven days, 2*d*. in the £ discount.

For cash within one month 1*d*. in the £ discount.

Amendment to Order Controlling Sheep and Lamb Pelts.

THE following amendment to the Order controlling sheep and lamb pelts, dated 9th April, 1917,* has been made by the Army Council under the date of 18th September, 1917 :—

1. In Clause 2, the words "other than extras of 10 lb. and upwards" shall be omitted.

2. After Clause 3, the following new Clause shall be inserted :—

> "4. No person shall, without a permit issued by or on behalf of the Director of Raw Materials, shave any skins taken from lambs killed in Great Britain."

The Wool (Off-Sorts) Order, 1917.

AN Order, dated 10th September, 1917, has been issued by the Army Council to the effect that :—

1. No person carrying on the business of manufacturer of woollen, worsted, or hosiery goods in any textile factory or workshop in Great Britain or the Isle of Man, shall, without a permit issued by or on behalf of the Director of Raw Materials, take delivery of any fleece wool or skin wool, not including daggings, locks, brokes and fallen wool, grown or to be grown on sheep in Great Britain in the season of 1917, from the grower thereof, provided that nothing herein contained shall refer to the delivery of

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* See *Journal*, May, 1917, p. 248.

fleece wool or skin wool to persons carrying on business of the description aforesaid if such persons are authorised by appointment to purchase wool on behalf of the Director of Raw Materials.

2. No person carrying on the business of manufacturer of woollen, worsted or hosiery goods in any textile factory or workshop in Great Britain or the Isle of Man shall, without a permit issued by or on behalf of the Director of Raw Materials, spin, draw, reel or weave for the use of the grower thereof any fleece wool or skin wool, including daggings, locks, brokes and fallen wool, grown or to be grown on sheep in Great Britain in the season of 1917.

3. No person in Great Britain or the Isle of Man shall, without a permit issued by or on behalf of the Director of Raw Materials, sell or deliver any locks, brokes, fallen wool, daggings, gathered wool or washed or willeyed locks grown or to be grown on sheep in Great Britain and the Isle of Man during the season of 1917, to any person carrying on the business of manufacturer of woollen, worsted or hosiery goods in any textile factory or workshop.

4. Notice is hereby given that it is the intention of the Army Council to take possession of all daggings, locks, brokes and fallen wool grown or to be grown on sheep in Great Britain and the Isle of Man during the season of 1917.

5. No person in Great Britain, or the Isle of Man, shall sell any daggings, locks, brokes and fallen wool at prices exceeding the prices set out in the schedule hereto annexed.

6. For the purposes of this Order, the expression "daggings" shall mean wool naturally clotted with dung and earth.

The expression "locks" shall mean any wool except daggings, which may have become detached from sheep at the time of shearing or thereafter.

The expression "washed or willeyed locks" shall mean daggings as hereinbefore defined, wherefrom the dung has been extracted by washing or any other process.

The expression "brokes" shall mean short wool obtained from the edges of the fleece in clipping or in sorting.

The expression "fallen wool" shall mean wool pulled or clipped from the skins of sheep which have died a natural death.

The expression "gathered wool" shall mean wool left by living sheep on hedges or other places.

7 The Daggings and Locks Order, 1917, is hereby cancelled.

SCHEDULE.—PRICE LIST.

Areas.	*Classification.*	*Maximum Prices.*
1	Greasy tail locks	* Two-thirds value of fleeces.
	Washed tail locks	Half value of fleeces.
2, 3, 4, 5, 6, 7 and 10.	Washed locks and fallen wool	Two-thirds average price of fleece wools in area.
	Unwashed locks and fallen wool.	One-half average price of fleece wools in area.
	Daggings, tar marks and shirlings	Proportionately less.

* Or to be valued by the District Executive Officer.

Areas.	*Classification.*	*Maximum Prices.*
9, 11 and 14	Washed white-faced locks and fallen wool.	12½*d*. per lb.
	Greasy white-faced locks and fallen wool	10*d*. per lb.
	Black-faced locks or fallen wool, free from dirt ..	8*d*. per lb.
	Daggings	18*s*. per cwt.
12 and 13 m	Washed locks and pelled wool	Two-thirds value of fleeces.
	Greasy locks and pelled wool	Half value of fleeces.
	Scoured tail wool	9*d*. per lb.
	Greasy tail wool free from daggings	7*d*. per lb.
	Greasy tail wool heavy in grease and daggings ..	Proportionately less.

In the case of sale by persons other than growers, 3*d*. per lb. may be added to the above prices, together with an allowance to cover any expense incurred by the vendor in cleansing, provided that the total increase on the grower's selling price shall not exceed in the aggregate 3*d*. plus the said allowance.

Appointment of Director of Feeding Stuffs.

LORD RHONDDA has appointed Mr. H. B. Renwick, Managing-Director of the County of London Electric Supply Company (Ltd.), to act as Director of Feeding Stuffs at the Ministry of Food with the duty of organising he supply and distribution of oil cakes and other cattle food.

THE following Notice, dated 18th September, 1917, has been issued by the Board:—

Prohibition of Imports of Currants and Gooseberries into Canada.

The Board of Agriculture and Fisheries desire to draw the attention of English nurserymen and other persons to the regulations issued by the Government of the Dominion of Canada, which prohibit the importation of all five-leaved species of the genus Pinus, and also all species and varieties of currants and gooseberries into Canada.

The importation of all pines and *Ribes* (currants and gooseberries) into the United States of America has already been prohibited.

AN Order (No. 1006), dated 1st October, 1917, has been made by the Food Controller to the effect that:—

The Wheat (Channel Islands and Isle of Man Export) Order, 1917.

Except under, and in accordance with, the terms of a licence granted by or with the authority of the Food Controller, a person shall not, after the 1st October, 1917, consign or ship any wheat from any part of the United Kingdom to any destination in the Channel Islands or to the Isle of Man except wheat already on shipboard for transport on that day.

AN Order (No 954), dated 26th September, 1917, has been made by the Food Controller to the effect that:—

The Horses (Rationing) Order No. 2, 1917.

1. No person shall feed any horse or permit any horse to be fed with cereal foodstuffs except as provided in this Order, or under the authority of the Food Controller.

2. This Order shall not apply to horses falling within the classes mentioned in the first Schedule.

3.—(*a*) Horses falling within the classes mentioned in the second and third Schedules may not on any day be fed with more than the quantity of cereal foodstuffs prescribed for such horses.

(*b*) The maximum quantity of oats which may be fed on any one day is prescribed in the Schedules, but maize, beans or peas may be used in lieu of oats, and if so used they shall be deemed for the purpose of this Order to be the equivalent of oats in the following proportions:—

7½ lb. maize = 10 lb. oats.
9 „ beans = 10 „
9 „ peas = 10 „

No other cereal foodstuffs may be used, except as specified in Clause 5 of this Order.

4. Horses falling within the classes mentioned in the fourth Schedule may not be fed with any cereal foodstuffs except as specified in Clause 5 of this Order.

5. No restriction is placed by this Order on the use of hay, straw, bran or dried brewer's grains for the feeding of any horse.

6. Any person or persons in possession of a horse or horses falling within the classes mentioned in the second and third Schedules shall keep records of the number and classes of horses kept, in sufficient detail to show (1) the total maximum rations authorised by this Order, (2) the description and quantities of the foodstuffs fed to such horses per week, and (3) the description and quantities of all cereal foodstuffs purchased; and such records shall at all reasonable times be open to the inspection of an officer of police or any person authorised by the Food Controller, or by a Local Authority as defined in the Local Authorities (Food Control) Order (No. 1), 1917, in England or Wales, or by a Local Authority as defined in the Local Authorities (Food Control) (Scotland) Order, 1917, in Scotland, or by the Food Control Committee appointed for Ireland by the Food Controller, in Ireland.

7. For the purpose of this Order:—

"Horse" shall include mare, gelding, colt, filly, pony and mule.

"Thoroughbred horse" shall mean a horse whose sire and dam are entered in the General Stud Book.

"Cereal foodstuffs" shall include all grains and beans and products thereof.

8. This Order shall come into force on the 1st October, 1917, and the Horses (Rationing) Order, 1917,* is hereby revoked as from that day, without prejudice to any proceedings in respect of any previous infringement thereof, and without prejudice to any exemptions granted or to be granted by, or with the authority of, the Food Controller thereunder.

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* See *Journal*, June, 1917, p. 362.

Schedule I.

Horses excluded from the operation of this Order :—

(*a*) Horses in the possession of the Army Council or the Admiralty, or exclusively used for the purposes of the Army Council or the Admiralty.

(*b*) Horses maintained and used exclusively for agricultural purposes.

(*c*) Stallions used exclusively for stud purposes.

Schedule II.

Horses solely or mainly used for trade or business purposes to be rationed :—

Class of Horse.	Maximum Daily Ration in terms of Oats.	
	When in hard and continuous work.	When not in hard and continuous work.
(*a*) Heavy dray and cart horses, and trotting vanners	16 lb.	12 lb.
(*b*) Light draught horses, and light trotting vanners	14 ,,	10 ,,
(*c*) Other light horses and cobs ..	11 ,,	8 ,,
(*d*) Ponies 14 hands and under ..	7 ,,	5 ,,

Note:—(1) *The jobbing out of horses is not in itself a trade or business purpose within the meaning of this Order.*

(2) *Pit horses and ponies working in the pits or at the pit mouth may be given 2 lb. extra per day.*

Schedule III.

Horses not used for trade or business purposes to be rationed :—

Class of horse.	Maximum daily ration in terms of oats.
(*a*) Brood mares	7 lb.
(*b*) Weaned foals	6 ,,
(*c*) Yearlings—	
1st January to 31st May	6 ,,
1st June to 31st August	3 ,,
1st September to 31st December	6 ,,
(*d*) Two and three year olds—	
1st January to 30th April	7 ,,
1st May to 31st October	3 ,,
1st November to 31st December	7 ,,
(*e*) Entire thoroughbreds, two years old and upwards not used for stud purposes	7 ,,

Class of horse.	**Maximum daily ration in terms of oats.**
(*f*) Hunters between the ages of 4 and 12 years (both inclusive), regularly hunted, sound and suitable for military service as (*a*) Officers' chargers, (*b*) Cavalry troop horses, or (*c*) Artillery riding horses; such horses being the property of (1) the Master or Committee of a recognised pack of hounds or of (2) recognised followers living within the limits of the Hunt The horses to be registered by the Master or his authorised deputy who shall notify the owners of the horses and the Committee on the Utilisation and Feeding of Horses, 7, Whitehall Gardens, S.W.1, of such registration. Horses so registered are liable to be called up by the Army Remount Department at any moment.	6 lb. from 1st Oct. to 31st Oct. 10 lb. from 1st Nov. till end of season.
(*g*) Racehorses registered with the Committee on the Utilisation and Feeding of Horses, 7, Whitehall Gardens, S.W.1, for the purposes of the limited racing scheme	15 lb.

Note.—The age of a horse is to be reckoned as beginning on the 1st January of the year in which the horse was foaled.

Schedule IV.

Horses not to receive any cereal foodstuffs :—

Horses not falling within any of the classes mentioned in Schedules I., II., and III., including :—

(*a*) Racehorses, hunters, and thoroughbreds, other than those specified in Schedules 1 and 3.

(*b*) Carriage horses, hacks, Char-a-banc horses, polo ponies, including all horses let out on hire for these purposes, and horses used in entertainments.

(*c*) Horses mainly used for other than business or trade purposes including all horses let out on hire for other than these purposes

THE following Notice has been issued under the date of 6th October, 1917 —

Hop Control Committee.*

The President of the Board of Agriculture and Fisheries has appointed a Committee to control the hop industry in the situation created by the reduction of brewing during the war The Committee will take over all stocks of hops grown in the year 1914 or thereafter, except stocks in the hands of brewers, and will retain control until normal conditions of brewing are resumed. No trading in hops is allowed except through the Committee or its agents

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* See *Journal*, August, 1917, p. 591.

The Committee is constituted as follows:—

Representatives of the Board of Agriculture.

G Foster Clark, Esq., Maidstone (*Hop Controller*).
W. W. Berry, Esq., Gushmere Court, Faversham, Kent. (*Vice-Chairman.*)
G. S. Orwin, Esq., School of Agricultural Economics, Oxford.

Hop Growers.

George Arnold, Hall Place, East Peckham, Kent.
Colonel J. F. Honeyball, Newcardene, Teynham, near Sittingbourne.
J. A. Raynham, Dairy Farm, Marden, Kent.
E. G. Shaw, Cold Green, Bosbury, Ledbury, Hereford.

Hop Merchants.

H. Buckland, The Foregate, Worcester.
C. Oscar Gridley, 9, Duke Street, London Bridge, S.E.1.
P. Horsley, 93 and 95, Borough High Street, S.E.1.
B. E. Richardson, 15, Southwark Street, S.E.1.
E. A. Strauss, M.P., 68, Borough High Street, S.E.1.

Hop Factors.

D. H. Gaskain, 45, Borough High Street, S.E.1.
Stuart Neame, 33, Borough High Street, S.E.1.
G. Thornton, 99, Borough High Street, S.E.1.
J. D. Whitehead, 45, Borough High Street, S.E.1.

Brewers.

S. C. Nevile, Brandon's Putney Brewery, Pimlico.
Percy C. Reid, Pryor Reid & Co., Ltd., Hatfield.
Colonel O. P. Serocold, Stag Brewery, Pimlico.
W. Sykes, John Smith's Tadcaster Brewery, Tadcaster.

The Secretary of the Committee is Mr. R. Wynne, 42, Borough High Street, London, S.E.1, to whom all communications should be addressed.

Government Seed Testing Station.

THE Food Production Department is about to establish, at 72, Victoria Street, London, S.W.1, a Seed-Testing Station. Further information will be published in the Press so soon as the Station is ready to begin operations. It is believed that this development of the Department's work will prove of great service to agriculturists and horticulturists generally.

Supplies of Basic Slag.

IN view of the demand for basic slag a statement of the position as regards supply may be of interest. All the available basic slag of the usual grades is being ground, and the total tonnage produced is in excess of pre-war figures. Every effort is being made by the Ministry of Munitions, acting in conjunction with the Food Production Department, to increase the total supply, and it is probable that the output for the year 1917–18 will reach 500,000 tons, as compared with about 400,000 tons in earlier years. As no export is now allowed, the whole of this quantity is available for home consumption. The demand is, however, much in excess of the supply and the whole of the estimated production up to the 31st of May next has been sold by makers for delivery to agricultural merchants, to whom farmers should send their orders. The only means of increasing the output further is by grinding certain accumulations of the lower grade slags which have not hitherto been utilised. Tests of some of these have given satisfactory results, and arrangements are being made for the manufacture and distribution of a considerable quantity. The bulk of the output will, however, need to be used within a reasonable radius of the works, as its low phosphatic value will not justify heavy transport charges.

Notice to Grub Bulbs and Flower Roots.

THE Isle of Ely Committee has issued a notice to bulb growers requiring them to take up 25 per cent. of their bulbs and flower roots and plant the land with wheat. Further, they are instructed to plant 25 per cent. of their land under bulbs with wheat or oats between the rows.

The Potato Bags (Returns) Order, 1917.

AN Order (No. 1051), dated 13th October, 1917, has been made by the Food Controller to the effect that :—

1. Every person owning potato bags (whether manufactured by himself or not) other than bags which will not hold more than half a cwt. of potatoes, shall on or before the 29th October, 1917, furnish to the Food Controller a return giving particulars of such bags owned by him at the close of business on the 22nd October, 1917, and such other particulars as may be required to complete the prescribed form of return,

2. The return shall be made on the form prescribed by the Food Controller to be obtained from and when completed to be returned to the Secretary, the Ministry of Food, 14, Upper Grosvenor Street, W.1. A copy of the form of return is set out at the foot of this Order.

3. A person who does not own more than 1,000 potato bags at the close of business on the 15th October, 1917, shall not be required to make any return under this Order.

4. For the purpose of this Order the expression "potato bags" shall include any bags or sacks which are used or intended to be used for holding potatoes, or which in the ordinary course of business would be used.

Sugar Beet for Stock.

ALTHOUGH sugar beet has not been grown largely in this country this year, inquiries sent to the Food Production Department suggest that a number of small growers have experimented with little patches and will be interested to learn what use they may put their crops to for stock feeding. As a pig food, sugar beet has about the same value as potatoes ; 4 lb. of either are equivalent to 8 lb. of mangolds or swedes or 1 lb. of cereal meals in a mixed ration. Sugar beet may be fed uncooked to pigs. The usual method is to cut the beets up small and mix them with other food in a proportion not higher than about 15 per cent. of the whole. From 20 to 30 lb. per head per day may be given to dairy cows; as much as 50 lb. to fattening cattle, 10 lb. to young cattle, smaller amounts to calves. Fowl keepers may hang up a root in the run. Rabbit keepers can feed carefully cleaned roots sparingly to their stock.

The Test Meeting for Women Land Workers at Edgbaston.

DESPITE very bad weather about 250 women farm workers entered for the Test Meeting held at Metchley Park, Edgbaston, Birmingham, on Thursday, 4th October, and a fairly numerous and very representative company of agriculturists attended to witness the tests. Candidates were limited to the Midland county areas of Birmingham, Warwick, Derby, Gloucester, Hereford, Leicester, Northampton, Oxford, Salop, and Stafford. The largest number of entries, namely 62, was registered by Warwickshire. The youngest candidate was only 13 years of age; most of the women were in the twenties; some few were middle-aged. The majority of the women were of various classes above the level of what is commonly known as the working class; some were farmers' daughters, others the daughters of professional men; a few were of the "leisured class"—women who before the War did no specifically useful work, at any rate outside the domestic circle. A minority of the women were townswomen who had lived in the country as children and either from choice or necessity had gone back to the land at least for the period of the War.

The candidates were divided broadly into three classes of workers; namely, those who had worked for twelve months or more on a farm; those who had worked for six months; and those who had worked for three months The schedule was designed to test the general capacity of candidates for all-round farm work, as well as for special branches, such as those of the wagoner and the cowman. The examination area was between 50 and 60 acres in extent on the farm of Messrs. A. J. Follows & Son, and the tests commenced at 5.30 in the morning. So numerous were the entries for the milking tests that the cows available on the farm were insufficient for the purpose, and a certain proportion of the women had to be tested on Mr. Thornicroft's farm at Hagley. The entries in various other classes of work were also large. The judges were all practical agriculturists nominated by representative bodies, and those of them who had not been in close touch with the developments of women labour on the land admitted their agreeable surprise at the way in which the different operations were carried out. The full list of awards will not be available for a few days, but it is an open secret that the percentage of passes is very high.

As 75 marks out of a possible 100 were necessary to secure an efficiency certificate and 70 per cent. for a highly commended certificate, it will be seen that the fact that in the milking tests not a single candidate failed is very significant, for there were 150 women who displayed their skill in milking by hand and 4 in milking by machinery. Two women obtained the full 100 marks, and 22 over 90 per cent. of the possible. The record in directions usually regarded as less suited to women labour was almost equally encouraging, as the table of awards when issued will show. For the moment it may be stated that 160 women took part in the operation of pulling, cleaning and piling roots;

102 in hoeing and singling roots; 70 in loading and unloading hay; 40 in mowing by hand, 35 in grooming, harnessing, and driving a single-horse wagon; 20 each in thatching and ploughing; 16 in hay trussing, and 15 each in ridging and drilling. Four women took part in the tractor ploughing, one of whom showed exceptional skill.

Of course, the heavy rain added enormously to the difficulty of most of the work, but experienced unofficial observers were very complimentary about the workmanlike manner in which most of the women tackled their various jobs, and especially about the pluck and spirit with which they handled difficulties as they arose. In the ploughing test a Birmingham girl who had been working on a Herefordshire farm attracted a good deal of attention by reason of the straightness of her furrows and the style generally of her work. The Derbyshire 13 year old girl was also naturally a subject of special interest.

The Meeting was organised jointly by a Committee with the Lord Mayor of Birmingham (Alderman Brooks) at its head, and the Women's Branch of the Food Production Department of the Board of Agriculture. Its aims were mainly three: firstly, to test the capacity of women workers on the land; secondly, to set up a standard of accomplishment to which earnest women land workers might reasonably aspire, thirdly, to prove to any sceptical farmers the variety of uses to which women are adapting themselves successfully in agriculture. From all these points of view the Meeting may fairly claim to have thoroughly justified itself. By common consent of all the well-known agricultural authorities who were present, this first experimental gathering of women farm workers under the auspices of the Board of Agriculture warrants the holding of similar gatherings in all the other districts of the country. Anyone who saw the women at Edgbaston can be no longer in doubt as to the great value of the contribution which the women's organisations are making to the solution of the agricultural labour problem

Captain Sir B. Stanier, M P., at the luncheon in connection with the Meeting, mentioned that on his three farms, one-third of the work is being done by women and "done well." This is a testimony that should carry considerable weight among the mass of farmers, for Sir B. Stanier is one of our best known agricultural authorities and represents a very high level of British farming.

The Recruiting of Land Women.

AN arrangement has been made by the Women's Branch of the Food Production Department, in consultation with the Timber Supply Department of the Board of Trade and the Forage Committees of the War Office, whereby all women required for the needs of these Departments will be recruited jointly in future, be interchangeable, and be enrolled as members of the Women's Land Army. A specific appeal for women urgently required for farm work will be issued shortly.

A statement has appeared in the Press that "the mobilisation of women for work of national importance is entirely in the hands of the Women's Army Auxiliary Corps" and that "the Women's Army Auxiliary, Corps not only supplies female labour for the Army, but covers the whole field of labour open to women." These statements are both erroneous. Women who have been required by the Government for the work of food production have been recruited under the direction of the Board of Agriculture. Early in the year when the Women's Land Army was formed, the Government arranged for the women to be recruited by the National Service Department, and subsequently handed over for selection, training, equipping and placing to the Women's Branch of the Food Production Department. At the present time the entire organisation of the Women's Land Army is in the hands of that Department, and it is through the Women's War Agricultural Committees in each county that the work is carried out, in close consultation with the Employment Exchanges of the Ministry of Labour.

Postponement of Date for the Coming into Operation of the 60s. Beef Price.

ON 9th October, 1917, Lord Rhondda (Food Controller) accompanied by Mr. Prothero (President of the Board of Agriculture) received a deputation representing the Central Chamber of Agriculture, the National Farmers' Union and the Royal Agricultural Society, together with representatives of the Scottish and Irish agricultural organisations. The following official report of the meeting has been issued:—

Lord Rhondda referred to the figures which had been published recently for the purpose of showing that the maximum prices fixed for meat were unremunerative to the farmer. He pointed out that he had only received estimates, and hardly any exact figures based on accounts, and so far as they had been examined they appeared to err on the side of charging up the products of the farm at much too high a rate. Further, they assumed that in January no farmer would get more than 60*s*. live weight for his beast. This price of 60*s*. live weight applied to second-grade cattle of a description preferred by the Army. Cattle of a higher quality would in any case get a higher price. Indeed, beasts yielding 60 per cent. meat, if sold at the maximum prices fixed for civilian meat of 7*s*. 4*d*. per stone, would realise practically 70*s* live weight. The price for meat had been fixed by the Cabinet with the concurrence of the Agricultural Departments for England, Scotland, and Ireland, and, although farmers did not like the sliding scale, they must not lay the blame on him alone. He knew that the leaders of the farmers' organisations realised as much as he did the danger of the high prices for cattle in the middle of the year, but he was glad to say that, although the price of other commodities had not yet been checked, during the past few weeks the wholesale prices of meat had been steadily coming down.

He must, however, recognise that there was a serious danger of a general shortage of meat next year; this was due to causes which neither he nor they could control. There was a general world famine in meat, to which Mr. Hoover had recently drawn attention in the United States. Other countries were already on meat rations. Germany, for example, only allowed about 1 lb. of meat per head per week, and if the voluntary appeal for economy which was now being made by Sir Arthur Yapp failed, he would without hestitation have to apply compulsory rationing in this country. He was bearing this in mind in making his future arrangements.

The price of oil cakes had been appreciably reduced during the last few weeks, and he anticipated that further reductions would be made.

Further, though he did not expect to have available nearly as much as they would like, the prospect of supplies was somewhat better than it had been a few weeks ago. He regretted, however, that, owing to various causes, the prices of store cattle, though they were coming down, had not come down so rapidly as they had hoped, partly, no doubt, due to the fact that the War Office had come into the home market for a large number of animals for the supply of the Army. They must all recognise that the Army must have first consideration, but it had unfortunately delayed the reduction in the price of stores, and though the price was not as low as he had hoped, supplies of stores were now rapidly coming into the market; indeed, there had been on the market 50 per cent. more in the past weeks than in the corresponding weeks of last year.

They were, he knew, mainly interested at the moment in the question of the price of cattle. He felt it his duty to say that he must remain obdurate on the maintenance of the 60*s*. live weight basis as the figure which he intended should be ultimately reached. Several deputations had urged on him that the price in January should be practically the same as at present obtained, namely, 72*s*. This he could not agree to. He was, however, prepared to continue the operation of the December price, namely, 67*s*. per cwt. live weight for Army cattle and 8s. per stone of 8 lb. dead weight for civilian supplies, and to postpone the coming into operation of the lowest maximum price until the end of June, 1918. He was willing to adopt this course owing to the probable world shortage of meat next spring, and the consequent necessity of encouraging production. Farmers must reckon their profits over a period, and base their calculations on the whole of their operations.

With regard to milk, he thought they recognised that farmers had been treated generously. The decision as to the maximum milk price was reached by the Cabinet last April before he took office, and he trusted that farmers would respond by securing ample supplies throughout the winter. He had serious misgivings as to the effect of the high price of milk on poor families, and he hoped to be able to make some arrangement by which milk would be available at cheaper prices for children.

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics for* September, 1917, published by the International Institute of Agriculture, contains estimates of the production of cereal crops in the Northern Hemisphere. The countries for which it is possible to give estimates are as follows: In *Europe*—Spain, France, Scotland, Ireland, Switzerland; in *America*—Canada, United States; in *Asia*—British India, Japan; in *Africa*—Algeria.

Wheat.—In the above-mentioned countries the total production is estimated at 208,126,000 qr. in 1917, against 201,439,000 qr. in 1916, an increase of 3·3 per cent., while the area sown was smaller by 2·9 per cent.

Rye.—In the specified countries, excluding France, Scotland British India, Japan, and Algeria, the yield is placed at 10,491,000 qr. this year, against 9,477,000 qr. last year, an increase of 10·7 per cent., the area sown being greater by 13·1 per cent.

Barley.—The production in the above-named countries, exclusive of France and British India, is estimated to amount to 55,698,000 qr. in 1917, against 54,407,000 qr. in 1916, an increase of 2·4 per cent., the area sown being greater by 5·0 per cent.

Oats.—The production in Spain, Switzerland, Canada, and United States is estimated to total 204,607,000 qr. this year, an increase of 19·9 per cent. compared with the previous year, when it amounted to 170,621,000 qr., while the area sown was greater by 7·2 per cent.

Maize.—The production in Spain, Switzerland, and United States is placed at 381,855,000 qr. this year, against 304,649,000 qr. last year, an increase of 25·3 per cent., the area sown showing an increase of 14·0 per cent.

France.—The official report for the month of August states that the stormy weather during the first three weeks generally delayed harvest, though in a few districts in the south drought was experienced. The crops in some districts have been laid, the grain often fell out, and some sprouted in the ear. Buckwheat and maize promise good crops. Potatoes have been damaged by disease and the yield, which promised well, will thus be reduced. Meadows are generally in good condition; the second hay crop is generally good except in districts where drought was experienced. (*The London Grain, Seed and Oil Reporter, 17th September*, 1917.)

The latest official estimate gives the area and production of this year's crops as follows: Wheat, 10,434,400 acres, 17,936,100 qr; barley, 1,788,100 acres, 4,703,600 qr.; oats, 7,702,800 acres, 25,260,000 qr.; rye, 2,001,400 acres, 3,883,500 qr. (*The London Grain, Seed and Oil Reporter*, 5th October, 1917.)

Canada.—According to a revised estimate the areas under the following crops this year are as follows (the acreage harvested in 1916 is given in brackets): Winter wheat, 809,250 acres (932,529); spring wheat, 12,740,400 acres (11,968,061); total wheat, 13,549,650 acres (12,900,590); oats, 11,806,000 acres (9,875,346); barley, 1,819,900 acres (1,681,180); flax, 678,750 acres (599,384). (*Broomhall's Corn Trade News, 25th September*, 1917.)

According to a report, dated 5th October, received from the High Commissioner for Canada, the weather in Manitoba, Saskatchewan and Alberta has been very favourable for threshing and autumn ploughing. The supply of labour is ample throughout Western Canada.

United States.—The Crop Reporting Board of the Department of Agriculture, in a report dated the 8th October, states that the estimated yields of the crops, as indicated by their condition on 1st October, or at the time of harvesting, are as follows: Winter wheat, 418,000,000 bush. as compared with 481,744,000 bush. last year; spring wheat, 242,000,000 bush. against 158,142,000 bush; total wheat, 660,000,000 bush. against 639,886,000 bush; barley, 202,000,000 bush. against 180,927,000 bush; oats, 1,581,000,000 bush. against 1,251,992,000 bush; maize, 3,211,000,000 bush. against 2,583,241,000 bush; and linseed, 11,000,000 bush. against 15,549,000 bush, last year. (*The London Grain, Seed and Oil Reporter*, 9th October, 1917.)

Argentina.—According to a report received from H.M. Minister at Buenos Aires, the prospects of the coming harvest are very favourable, and the area under wheat has been considerably increased this year.

The area sown with wheat is estimated at 17,574,000 acres; oats, 2,853,000 acres; and linseed, 3,310,000 acres.

India.—According to the final general memorandum the acreage of wheat in 1916–17 was 32,940,000 acres, against 30,320,000 acres in the previous season, or an increase of nearly 9 per cent.; and the yield is estimated at 47,404,000 qr., against 40,376,000 qr. last season, or an increase of 17 per cent. Both area and production are the largest on record. (*The London Grain, Seed and Oil Reporter*, *24th September*, 1917.)

Live Stock in Argentina.—According to a report received from H.M. Minister at Buenos Aires the result of the third census of live stock taken in June, 1914, has now been published. The numbers of live stock at the previous census in 1908 are given for comparison. The number of cattle in 1914 was 25,866,763, as compared with 29,116,625 in 1908: horses, 8,323,815, against 7,531,376; mules, 565,069, against 465,037; sheep, 43,225,452, against 67,211,754; goats, 4,325,280 against 3,945,086; and pigs, 2,900,585, against 1,403,591 in 1908.

Live Stock in Denmark.—The numbers of live stock in Denmark on the 20th February, 1917, were as follows (the numbers on the 29th February, 1916, being shown in brackets): Horses, 538,395 (515,415); cattle, 2,452,853 (2,289,996); sheep, 267,979 (254,368); pigs, 1,980,727 (1,983,255). (*International Crop Report and Agricultural Statistics*, *September*, 1917.)

Live Stock in the Netherlands.—The numbers of live stock on the 1st April, 1917, were as follows (the numbers in June, 1913, being shown in brackets): Cattle, 2,301,007 (2,096,599); sheep, 520,810, exclusive of lambs born in 1917, (842,018); pigs, 1,185,565 (1,350,204). (*International Crop Report and Agricultural Statistics*, *September*, 1917.)

Live Stock in Norway.—The following are the estimates of live stock on the 30th September, 1916 (the corresponding numbers on the 30th September, 1915, being shown in brackets): Horses, 189,175 (186,217); cattle, 1,119,306 (1,120,517); sheep, 1,281,030 (1,329,559); goats, 230,055 (240,303); pigs, 221,217 (208,522). (*International Crop Report and Agricultural Statistics*, *September*, 1917.)

Agricultural Conditions in England and Wales on 1st October.

THE reports furnished by the Crop Reporters of the Board on agricultural conditions in England and Wales indicate that September was upon the whole favourable to agriculture in the eastern half of the country; on the western side the weather was more unsettled, and harvest operations were delayed accordingly. Over the greater part of England the corn was secured, generally by the second or third week of the month, in satisfactory condition; but in the west a certain quantity still remained to be carted, and some in Wales had still to be cut, while much was harvested in damp condition.

The potato crop is now being lifted; in some districts much progress has been made, and in others little has been done, especially in the west, where the late harvest and rainy weather have rather postponed this work. There is a good deal of disease in the south-west, but the position does not appear to be so bad as was feared; and in the rest of the country there is very little disease. Except in the north-west, the crop is everywhere above average, especially in the eastern counties, and the yield is expected to be 4 per cent. above average.

Turnips and swedes are bad in the eastern and north-eastern counties, where there is a thin plant; but elsewhere they appear to be average, and even over in the south-west. On the whole the yield is expected to be 5 per cent. below the average. Mangolds, on the other hand, are everywhere satisfactory, though they might have been improved by warmer weather, and the yield will probably be 3 per cent. over average.

In the east, preparation of the land for autumn sowing has made good progress under favourable conditions, and some wheat and winter oats have already been sown. In the west the lateness of the harvest has allowed of very little being done towards getting the land ready for the new crops. The stubbles are everywhere very full of weeds.

Seeds are everywhere a promising plant, although in several of the western districts they have suffered some damage from the corn being laid.

Pastures are full of keep, more so than usual at this time of year, but it is mostly not of very good quality, owing to the wet. Live stock have generally improved during the month.

There is still great scarcity of skilled labour, but women and soldiers have everywhere been of great assistance, and now that the harvest is over the situation is a little easier than it has been for some time past.

Agricultural Labour in England and Wales during September.

THE following local summaries give further details regarding agricultural labour in the different districts of England and Wales:—

Northumberland, Durham, Cumberland, and Westmorland.—Skilled men are scarce, but, although farmers could do with more help, work is fairly well forward, and soldiers and women gave good help with the harvest.

Lancashire, and Cheshire.—The supply of labour is short in most districts, but there has generally been sufficient to meet the requirements up to the present.

Yorkshire.—Labour is still scarce, but the position seems to be easier in this respect, and the fine weather at harvest-time helped very considerably.

Shropshire and Stafford.—Labour is still scarce, but a fair supply of soldier and female labour has been available for the harvest.

Derby, Nottingham, Leicester, and Rutland.—Skilled workers are scarce, but soldiers and women have given good help with the harvest.

Lincoln and Norfolk.—In the potato and fruit districts the shortage in the supply of labour is being felt appreciably, but elsewhere, though the supply is short, farmers are getting along fairly satisfactorily with the help of women and soldiers.

Suffolk, Cambridge, and Huntingdon.—The supply of labour is still deficient, but the corn harvest was cleared up satisfactorily with the help of women and soldiers.

Bedford, Northampton, and Warwick.—Labour is still scarce, but soldiers have given good assistance, and the number of women workers on the land is increasing.

Buckingham, Oxford, and Berkshire.—Skilled labour is deficient, but considerable assistance has been rendered by soldiers and women, and now that the harvest is almost completed the situation is somewhat easier.

Worcester, Hereford, and Gloucester.—The supply of labour is generally short, particularly skilled labour, but considerable assistance has been given by soldiers and women.

Cornwall, Devon, and Somerset.—The supply of labour is short and considerable difficulty has been experienced in getting in the harvest. Skilled labour is very scarce, but much assistance has been given by soldiers.

Dorset, Wiltshire, and Hampshire.—Labour is still deficient, but assistance has been rendered by soldiers and women, which has enabled the harvest work to be got through.

Surrey, Kent, and Sussex.—The supply of labour is still short, especially skilled men, and carters, ploughmen, and thatchers are very difficult to obtain. Considerable help has been rendered by women and soldiers.

Essex, Hertford, and Middlesex.—Although the supply of labour is deficient, the work has been got through with the assistance of soldiers and women.

North Wales.—Women and soldiers have helped materially, and although labour is scarce the situation is easier now that most of the summer work is completed.

Mid-Wales.—Labour is still deficient, but good assistance has been rendered by soldiers

South Wales.—The supply of labour is deficient, and the shortage of horsemen for autumn cultivation is expected to be much felt.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st October, 1917, certain diseases of animals existed in the countries specified :—

Denmark (month of July).—Anthrax, Swine Erysipelas, Swine Fever.

France (for the period 2nd—15th September).—Anthrax, Black-leg, Glanders and Farcy, Rabies, Swine Erysipelas, Swine Fever.

Holland (month of July).—Anthrax, Foot-rot, Glanders, Swine Eryiseplas.

Italy (for the period 3rd—9th September,)—Anthrax, Black-leg, Foot-and-Mouth Disease (821 outbreaks), Glanders and Farcy, Rabies, Sheep-scab, Swine Fever.

Norway (month of August).—Anthrax, Black-leg, Swine Fever.

Russia (month of January).—Anthrax, Cattle-plague, Foot-and-Mouth Disease (12,393 animals), Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Fever, Swine Erysipelas.

Sweden (month of July).—Anthrax, Black-leg, Swine Fever.

Switzerland (for the period 3rd—9th September).—Anthrax, Blackleg, Swine Fever.

No further returns have been received in respect of the following countries: Austria, Belgium, Bulgaria, Germany, Hungary, Montenegro, Rumania, Serbia, Spain.

The Weather in England during September.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 1st Sept.:								
England, N.E. ...	57·3	+0·5	1·89	48	+33	6	2 8	—2·1
England, E.	57·9	—0·7	1·30	33	+19	6	3·4	—2·3
Midland Counties ...	56·6	—0·7	1·96	50	+33	7	2·9	—2 0
England, S.E. ...	58·1	—1·4	1·88	48	+31	6	2·9	—3·0
England, N.W. ...	55·7	—1·0	2·42	61	+38	7	1·9	—2·6
England, S.W. ...	56·3	—1·8	2·40	61	+37	6	3·2	—2·2
English Channel ...	58·2	– 2·3	2·00	51	+35	5	4·2	—2·2
Week ending 8th Sept.:								
England, N.E. ...	58·6	+2·7	0·06	1	10	1	6·9	+1·9
England, E.	59·7	+1·9	0·31	8	— 4	2	8·1	+2·8
Midland Counties ..	58·8	+2·1	0·17	4	— 8	2	6·9	+2·1
England, S.E. ...	59·9	+1·0	0·30	8	7	3	7·3	+1·6
England, N.W. ..	58·1	+1·8	0·09	2	—14	3	4·8	—0·2
England, S.W. ...	58·2	+0·7	0·31	8	— 9	3	6·4	+1·1
English Channel ...	59·9	—0 5	0·27	7	— 7	4	6·8	+0·6
Week ending 15th Sept:								
England, N.E. ..	55·4	+0·3	0·12	3	— 4	2	5 0	+0·1
England, E.	57·0	+0·1	0·08	2	— 7	1	5·4	—0·1
Midland Counties ..	56·4	+0·7	0·20	5	— 3	3	3·7	—1·1
England, S.E. ...	59·0	+1·1	0·13	3	— 5	2	5·8	0 0
England, N.W. ..	56·4	+0·7	0·73	19	+ 6	3	4·6	—0·1
England, S.W. ...	57·9	+1·1	0·39	9	— 3	3	3·7	—1·7
English Channel ...	60·2	+0·5	0·29	7	— 4	4	5·3	—1·4
Week ending 22nd Sept.:								
England, N.E. ...	56·8	+3·0	0·30	8	— 1	4	4·0	—0·3
England, E.	57·9	+2·3	1·03	26	+17	3	4·0	—0·9
Midland Counties ...	56·8	+2·5	0·96	24	+14	4	3·1	—1·2
England, S.E. ...	58·6	+2·1	0·76	19	+ 9	3	3·8	—1·5
England, N.W. ...	56·6	+2·1	0·82	21	+ 7	6	3·2	—1·1
England, S.W. ...	56·8	+1·0	1·37	35	+21	4	2·3	—2·6
English Channel ...	60·0	+1·2	0·68	17	+ 5	3	4·5	—1·9
Week ending 29th Sept.:								
England, N.E. ..	56·4	+3·6	0·14	4	— 8	1	3·2	—1·0
England, E.	57·0	+3·0	0·05	1	—13	1	5·3	+0·6
Midland Counties ...	56·1	+3·2	0·15	4	— 9	2	3·7	—0·4
England, S.E.... ...	57·0	+1.8	0·08	2	—13	1	5·6	+0·8
England, N.W. ...	56·4	+3·2	0·45	12	— 8	3	2·5	—1·3
England, S.W. ...	56·3	+1·8	0·31	8	—13	2	3·0	—1·1
English Channel ...	57·9	+0·1	0·17	4	—15	3	6·2	+1·1

* 1 inch=2·54

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(*From the Returns of the Board of Agriculture and Fisheries.*)

DISEASE.	SEPTEMBER.		NINE MONTHS ENDED SEPTEMBER.	
	1917.	1916.	1917.	1916.
Anthrax :—				
Outbreaks	26	34	348	400
Animals attacked	26	36	396	471
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	24
Glanders (including Farcy) :—				
Outbreaks...	4	6	22	41
Animals attacked	4	11	36	101
Parasitic Mange :—				
Outbreaks	115	79	1,965	1,758
Animals attacked	154	161	3,763	3,950
Sheep-Scab:—				
Outbreaks	9	13	404	195
Swine Fever :—				
Outbreaks	106	303	1,793	3,536
Swine slaughtered as diseased or exposed to infection	50	179	782	8,768

IRELAND.

(*From the Returns of the Department of Agriculture and Technical Instruction for Ireland.*)

DISEASE.	SEPTEMBER.		NINE MONTHS ENDED SEPTEMBER.	
	1917.	1916.	1917.	1916.
Anthrax :—				
Outbreaks	—	—	3	3
Animals attacked	—	—	5	7
Foot-and-Mouth Disease :—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy) :—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	—
Parasitic Mange :—				
Outbreaks	3	7	40	54
Sheep-Scab :—				
Outbreaks	31	44	292	317
Swine Fever :				
Outbreaks	11	37	185	256
Swine slaughtered as diseased or exposed to infection	36	448	1,079	1,681

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in September and August, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	SEPTEMBER.		AUGUST.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK :—	per stone.*	per stone.*	per stone.*	per stone.*
Cattle :—	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Polled Scots	17 6	16 9	18 3	17 8
Herefords	17 1	15 11	17 8	16 2
Shorthorns	17 8	16 0	18 0	16 5
Devons	17 6	15 11	18 0	16 5
Welsh Runts	17 0	15 9	—	16 7
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	15½	14	16	14
Sheep :—				
Downs	16½	15	16¾	15¼
Longwools	15¼	14½	15¼	14¼
Cheviots	15½	14¼	16¾	15¼
Blackfaced	13½	12¼	—	—
Welsh	14½	13½	14¼	13¾
Cross-breds	16¼	14½	16¾	15
	per stone.*	per stone.*	per stone.*	per stone.*
Pigs :—	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Bacon Pigs	18 0	17 3	17 4	16 5
Porkers	18 5	17 8	17 7	16 9
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ *s.*	£ *s.*	£ *s.*	£ *s.*
Shorthorns—In Milk ...	45 5	35 8	44 9	34 12
" —Calvers ...	42 8	34 4	42 5	33 12
Other Breeds—In Milk ...	41 1	33 18	44 11	34 1
" —Calvers ...	29 0	25 0	—	—
Calves for Rearing	3 17	2 19	3 19	2 19
Store Cattle :—				
Shorthorns—Yearlings ...	16 3	13 8	15 18	13 3
" —Two-year-olds...	23 13	20 1	24 12	19 19
" —Three-year-olds	31 12	26 16	—	24 12
Herefords —Two-year-olds...	28 14	23 1	27 14	22 16
Devons— "	25 2	22 8	26 12	22 14
Welsh Runts— "	23 6	20 7	—	—
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Downs or Longwools ...	59 10	49 10	58 9	48 10
Store Pigs :—				
8 to 12 weeks old	35 8	27 3	34 5	25 1
12 to 16 " "	58 10	47 1	57 7	45 0

* Estimated carcass weight.

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in September, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb	per 12 lb.	per 12 lb	per 12 lb	per 12 lb.
British	—	—	—	—	25 0	24 0
	per cwt.	per cwt.	per cwt	per cwt	per cwt.	per cwt.
Irish Creamery—Fresh	220 0	212 0	—	—	—	—
,, Factory	206 0	200 0	—	—	—	—
Danish...	—	—	—	—		—
French...	—	—	—	—	220 0	215 0
Dutch	—	—	—	—	—	—
Australian	212 0	208 0	—	—	—	—
New Zealand		—	—	—	—	—
Argentine	—	—	—	—	209 0	206 0
CHEESE :—						
British—						
Cheddar	138 6	—	—	—	140 0	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	145 6	142 6	146 0	—
			per cwt.	per cwt.	per cwt.	per cwt.
Canadian	130 6	—	130 6	—	130 6	—
BACON :—						
Irish (Green)	167 6	161 0	—	—	167 0	165 0
Canadian (Green sides)	—	—	157 0	—	158 0	—
HAMS :—						
York (Dried or Smoked)	—	—	—	—	194 0	186 0
Irish (Dried or Smoked)	—	—	—	—	187 6	180 6
American (Green) (long cut)	136 0	134 0	137 0	—	137 0	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120	per 120.
British...	—	—	—	—	30 2	27 8
Irish	25 6	—	25 4	23 7	26 3	24 10
Danish	—	—	—	—	26 6	24 9
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Early Eclipse... ...	146 6	125 0	—	—	126 6	116 6
Other First Earlies ...	146 6	120 0	160 0	143 6	116 6	108 6
British Queen ...	145 0	121 6	161 6	146 6	131 6	121 6
HAY :—						
Clover	—	—	150 0	140 0	144 6	136 0
Meadow	—	—	—	—	144 6	136 0

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in September, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	Quality	Birmingham.		Leeds.		Liverpool.		London.		Manchester.	
		per cwt.		per cwt.		per cwt.		per cwt.		per cwt.	
		s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
BEEF :—											
English	1st	121	6	120	0	—		116	0	116	6
	2nd	113	0	116	0	—		108	0	112	0
Cow and Bull	1st	107	6	112	6	104	0	101	6	102	6
	2nd	98	0	106	6	85	0	92	0	97	0
Irish : Port Killed	1st	—		116	0	118	0	113	0	115	6
	2nd	—		111	0	111	0	105	0	108	6
Argentine Frozen—											
Hind Quarters	1st	116	0	—		—		—		—	
Fore ,, ...	1st	93	6	—		—		—		—	
Argentine Chilled—											
Hind Quarters	1st	113	0	111	0	107	6	112	0	107	6
Fore ,, ...	1st	92	0	89	0	87	0	91	0	87	0
American Chilled—											
Hind Quarters	1st	116	6	—		107	6	109	6	107	6
Fore ,, ...	1st	95	6	—		87	0	92	0	87	0
VEAL :—											
British	1st	121	6	123	6	121	6	123	0	119	0
	2nd	109	6	104	0	92	0	106	6	92	0
Foreign...	1st	—		—		—		—		—	
MUTTON :—											
Scotch	1st	122	6	125	0	—		124	0	122	6
	2nd	115	6	119	0	—		119	0	118	0
English...	1st	122	6	125	0	—		123	6	122	6
	2nd	115	6	119	0	—		118	0	118	0
Irish : Port Killed	1st	122	6	—		122	6	123	0	122	6
	2nd	116	6	—		113	0	117	6	115	6
Argentine Frozen	1st	106	0	107	6	106	0	104	0	106	0
New Zealand ,, ...	1st	86	6	—		88	6	87	6	88	6
Australian ,, ...	1st	—		—		—		—		—	
LAMB : –											
British	1st	122	6	125	0	125	0	125	0	125	0
	2nd	114	6	120	0	112	0	121	6	118	0
New Zealand	1st	101	0	—		100	6	98	0	100	6
Australian	1st	101	0	100	6	99	6	98	0	99	6
Argentine	1st	105	6	—		106	6	106	0	106	6
PORK :—											
British	1st	134	6	142	6	136	0	136	0	136	0
	2nd	130	6	130	6	121	6	—		121	6
Frozen	1st	—		119	0	—		119	6	—	

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1915, 1916 and 1917.

Weeks ended (*in* 1917).	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan. 6...	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
,, 13...	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
,, 20...	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
,, 27...	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb. 3...	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
,, 10...	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
,, 17...	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
,, 24...	56	0	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar. 3...	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
,, 10...	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
,, 17...	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
,, 24...	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
,, 31...	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl. 7...	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
,, 14...	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
,, 21...	56	5	55	3	84	10	31	5	52	10	70	6	30	11	31	8	59	8
,, 28...	58	3	56	3	81	1	32	7	53	5	69	5	31	5	32	4	58	6
May 5...	60	5	55	7	77	7	33	3	53	1	64	4	32	4	32	10	54	9
,, 12...	61	7	55	5	78	0	34	0	53	5	64	11	32	5	33	1	55	2
,, 19...	62	0	55	0	77	11	34	1	52	10	64	10	32	8	33	0	55	2
,, 26...	61	11	54	7	78	0	34	8	52	9	64	9	32	7	33	4	54	11
June 2...	61	9	53	3	78	0	35	4	53	9	65	11	32	5	33	3	54	11
,, 9...	60	1	51	2	78	0	34	5	52	8	67	7	32	4	32	7	55	0
,, 16...	56	1	48	10	78	2	34	3	50	9	75	6	31	9	32	1	55	1
,, 23...	52	0	47	6	78	1	34	4	49	10	75	0	31	9	31	3	55	2
,, 30...	49	5	46	3	78	3	35	3	49	1	73	11	31	1	30	10	55	1
July 7...	50	1	46	3	78	1	34	7	45	6	69	5	31	6	30	8	55	2
,, 14...	52	7	48	11	78	2	35	8	47	5	70	10	31	6	31	6	55	1
,, 21...	53	10	51	6	78	3	35	10	48	8	72	1	32	1	32	3	55	2
,, 28...	55	3	53	5	78	3	36	1	47	2	65	7	31	1	32	5	55	2
Aug. 4...	55	4	55	1	78	2	35	7	46	1	73	6	31	5	32	9	55	0
,, 11...	55	2	56	7	78	4	37	0	46	11	76	1	31	7	31	2	55	0
,, 18...	54	3	58	1	78	7	39	4	48	0	68	11	31	4	30	8	55	6
,, 25...	51	11	59	0	76	7	38	3	47	1	70	7	30	0	31	6	54	7
Sept. 1...	45	3	59	4	72	1	38	1	48	5	60	4	26	10	30	5	49	0
,, 8...	43	0	59	3	71	6	37	11	51	7	59	3	26	8	31	1	46	7
,, 15...	42	9	59	11	70	7	39	0	52	6	57	2	26	4	30	9	45	0
,, 22...	43	3	59	4	70	8	39	8	53	3	56	10	26	1	30	9	45	8
,, 29...	43	5	58	10	70	6	40	4	54	1	58	5	26	5	31	1	44	7
Oct. 6...	44	1	59	2	70	8	41	0	54	5	57	9	26	5	30	9	44	9
,, 13...	45	9	59	7			42	3	53	10			27	1	31	6		
,, 20...	48	2	60	9			44	0	53	8			28	1	31	11		
,, 27...	50	3	62	10			46	2	54	6			29	1	32	10		
Nov. 3...	51	6	66	7			47	3	56	2			30	4	34	0		
,, 10...	52	8	69	8			47	5	58	0			30	11	35	8		
,, 17...	53	6	70	9			47	11	59	8			31	3	37	8		
,, 24...	54	2	70	8			48	7	61	8			31	1	39	7		
Dec. 1...	53	7	71	3			48	11	63	1			30	11	41	4		
,, 8...	52	10	72	1			47	10	65	6			30	4	44	1		
,, 15...	53	11	73	2			47	5	66	5			30	6	45	10		
,, 22...	53	10	74	8			47	2	67	3			30	7	46	5		
,, 29...	54	9	75	10			47	5	67	5			30	10	47	4		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

AVERAGE PRICES of **British Wheat, Barley, and Oats** at certain Markets during the Month of September, 1915, 1916, and 1917.

—	WHEAT.			BARLEY.			OATS.		
	1915.	1916.	1917.	1915.	1916.	1917.	1915.	1916.	1917.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
London ...	44 4	60 7	73 6	40 4	53 7	60 2	27 9	32 10	50 1
Norwich ...	44 1	56 11	71 9	38 4	49 7	60 4	25 10	30 7	46 0
Peterborough	41 11	58 7	69 9	38 6	53 0	56 6	26 0	29 7	41 10
Lincoln ...	44 1	59 9	70 0	38 8	52 1	57 8	26 9	30 3	45 5
Doncaster ...	44 2	59 6	71 11	36 10	53 10	56 4	27 7	31 4	44 7
Salisbury ...	43 11	58 5	71 11	38 8	49 9	61 2	27 0	31 0	50 5

Statement showing the Average Price of BRITISH CORN, per Quarter (Imperial Measure), for the Quarter ending Michaelmas, 1917, pursuant to the Corn Returns Act, 1882.

Wheat.	*Barley.*	*Oats.*
s. d.	*s. d.*	*s. d.*
75 0	65 5	51 1

ADDITIONS TO THE LIBRARY.

Agriculture, General and Miscellaneous—

Russell, E. J.—Soil Conditions and Plant Growth. Third Edition. (243 pp. + 13 fig.) London: Longmans, Green & Co., 1917. 6*s.* 6*d.* net. [63.115; 63.161.]

Engelbrecht, T. H.—Landwirtschaftlicher Atlas des Russischen Reiches in Europa und Asien. (41 pp. + 30 maps) Berlin: D. Reimer, 1916 [63 (47).]

Field Crops—

Bangor University College Department of Agriculture.—Varieties of Oats and Wheat. (8 pp.) Bangor, 1917. [63.314; 63.311 (04).]

McCall, A. G.—Field and Laboratory Studies of Crops: An Elementary Manual for Students of Agriculture. (133 pp.) New York: John Wiley & Sons. London: Chapman & Hall, 1916. [371; 63.3 (02).]

Horticulture—

Emptage, W. F.—Commercial Strawberry Culture. (61 pp.) London: Benn Bros., 1917. 1*s.* [63.41 (c).]

Elford, P., and *Heaton, S.*—The Cultivation of Allotments. (62 pp.) Oxford: The Clarendon Press, 1917. 8*d* net. [63.51 (04).]

Plant Diseases—

Union of South Africa Department of Agriculture.—Science Bull. 9:—The Codling Moth and its Control in the Western Province. (48 pp.) Pretoria, 1916. [63.27.]

Live Stock—

Hansson, N.—Handbok i Utfodringslära. Del III, Husdjurens Utfodring. (461—720 pp.) Stockholm. C. E. Fritze, 1916. [63.604 (02).]

Davies, C. J.—Rabbit-Keeping in War-Time. (32 pp.). London: Offices of "Country Life," and George Newnes, 1917. 7*d.* net. [63.69.]

Powell-Owen, W.—Rabbit-Keeping on Money-Making Lines. (147 pp.) London: George Newnes, 1917. 2*s.* 6*d.* net. [63.69.]

Sanders, A H and *Dinsmore, W*—A History of the Percheron Horse (602 pp) Chicago: "Breeder's Gazette," 1917 [63 61 (02).]

Morris, T N—Microscopic Analysis of Cattle Foods. (74 pp) Cambridge The University Press, 1917 2*s* net [614 33; 578]

Henry, W A and *Morrison, F B*—Feeds and Feeding. A Handbook for the Student and Stockman 16th Edition. (691 pp) Madison, Wisconsin The Henry-Morrison Company, 1916 [63.604, 612 394.]

Nicholls, G J—Bacon and Hams (91 pp + plates and chart) London: The Institute of Certified Grocers, 1917 3*s* 6*d* net [664 91]

Dairying and Food, General—

Cameron, L C R—The Wild Foods of Great Britain: Where to Find them and how to Cook them (128 pp + 11 plates) London: George Routledge & Sons, 1917 1*s* 6*d* net [376]

Birds, Poultry, and Bees—

Brown, E—An Easy Poultry Guide (92 pp) London. C Archer Pearson, 1917 1*s* net [63 65 (02)]

Paynter, F G—Good Living from Poultry for Disabled Soldiers and Others (39 pp) London George Newnes, 1917 1*s* net [63 651 (04)]

Forestry—

Toumey, J W—Seeding and Planting: A Manual for the Guidance of Forestry Students, Foresters, Nurserymen, Forest Owners, and Farmers (455 pp) New York John Wiley & Sons; London: Chapman & Hall, 1916 16*s* 6*d* net [63 49 (022)]

Somerville, W—British Forestry. Past and Future A Paper read before the Worshipful Company of Carpenters on 4th April, 1917 (19 pp) London Oxford University Press, 1917 6*d* net. [63 49 (42)]

Ferguson, J A—Farm Forestry (241 pp) New York John Wiley & Sons, London Chapman & Hall, 1916 6*s* net [63 49 (022)]

Engineering—

Farming by Motor All about Farm Tractors and Motor Ploughing (96 pp) Produced by "The Motor" and "The Commercial Motor" London Temple Press, 1917 1*s* 6*d* net [63 17 (02); 63 196]

Economics—

West of Scotland Agricultural College.— Bull 81—Discharged Disabled Sailors and Soldiers Training and Employment in Rural Occupations. (197–231 pp) 1917 [331]

Tomkinson C W—State Help for Agriculture (189 pp) London: T Fisher Unwin, 1917 3*s* 6*d* net [338 98]

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WART DISEASE OF POTATOES: REPORTS ON THE IMMUNITY TRIALS AT ORMSKIRK IN 1915-16-17.

WART DISEASE (*Chrysophlyctis endobiotica*) was first reported to the Board of Agriculture and Fisheries in 1901, but it was certainly present in Lancashire, Cheshire and other districts many years previous to that date. Of recent years the disease has become much more prevalent, and the cultivation of such varieties of potatoes as President, Up-to-Date, King Edward and Arran Chief, all of which are highly susceptible to the disease, has increased the loss due to its ravages.

The treatment of infected soil by such fungicides as lime, sulphur, formalin, etc., has up to the present proved useless. Those fungicides which are capable of destroying the spores of the disease also kill the potato plants.

Fortunately for the potato growing industry in many parts of the country it was found that certain varieties of potatoes were resistant, or rather, absolutely immune to the disease.

This fact has been observed by growers whose land has become infected.. They had noted that the disease was never found on such varieties as Maincrop, St. Malo Kidney, Conquest, and others. In 1909 the Board requested Mr. Malthouse to carry out a series of tests at the Harper Adams College, and the result of the trials proved that the information obtained from the growers was correct and that certain varieties were immune to Wart Disease.

In Lancashire and Cheshire potato growing is an important branch of the farming industry, and it was in these counties that the disease was rapidly increasing and causing serious losses. It was therefore decided in 1915 to carry out a series of trials at some convenient centre in the district. The farm of the Ormskirk Poor Law Institution was known to be badly infected with the disease. The Farm Committee kindly placed at the disposal of the Board such land as might be required for experimental purposes

The Soil.—The soil is a light, sandy loam. Previous crops of potatoes, such as Up-to-Date, King Edward and Epicure had been severely attacked by Wart Disease. For the success of the trials it was essential to prove that the whole of the land was infected. Certain well-known susceptible varieties, including Arran Chief and Up-to-Date, were planted on control plots in various parts of the fields, and single tubers of such varieties were planted on the plots where other varieties were being tested. In every instance Wart Disease appeared on the plots used as controls. Further evidence as to the extent of soil infection was obtained from a plot of King George in 1916. In this plot were a number of Up-to-Date "rogues" and every one of these "rogues" was found to be affected with Wart Disease, although the King George potatoes were free from disease. Again, in 1917 a plot of Dominion was found to contain a large percentage of Arran Chief. The plants of this latter variety were marked and when lifted Wart Disease was found to be present on each of them. It is thus practically certain that all the soil is thoroughly infected, but in order to make the test more thorough, in the 1915 and 1916 trials the plots were duplicated. Each variety was planted on two plots, one plot being on a narrow border where the disease had been very evident for some years and the other plot being on one of the fields. But it was found that this duplication was quite unnecessary. Every variety that was diseased on the small border plot was also diseased on the main plot. This duplication was therefore discontinued in the 1917 trials.

Manures.—In the 1915 trials no artificial manures were used, but 12 tons per acre of farmyard manure were applied. In the 1916 and 1917 trials, in addition to 12 tons of farmyard manure, the plots were given a top dressing of 1½ cwt. of sulphate of ammonia per acre.

Planting has been commenced each year about the second week in April and finished early in May. In 1917, however, one variety was planted as late as the 28th July, but Wart Disease was observed on it on the 1st September.

Size of Plot.—Each plot measured $\frac{1}{200}$th of an acre, but in some instances a smaller area was planted where only a very few tubers had been sent for trial.

Removal of "Rogues."—In these trials it is essential that the stock being tested shall be pure. Each plot was therefore carefully inspected several times during the growing season and the "rogues" removed.

Lifting.—Lifting was commenced each year as soon as the early varieties were mature and was completed early in October. A careful record was made of the weight of crop and the amount of Wart Disease present. The weights given in the following tables include ware, "seed" and chats. These trials are essentially for the purpose of testing the immunity of the varieties, and the question of yield is quite a secondary consideration. At the same time the weights are an indication of the degree of the susceptibility of the variety.

Immunity.—Immunity is an inherent quality of the variety and is not affected in any way either by season, manures, soil condition, vigour, or age of the variety. It has been suggested that a variety when first introduced may prove to be immune, but that eventually after being in cultivation for some years it will become susceptible This is disproved by the fact that many of the immune varieties are quite old varieties. Thus Schoolmaster has been in cultivation for over 40 years and is still immune. Similarly, Abundance, Conquest, Edzell Blue, Langworthy and others have been in cultivation for many years. Then again, the vigour of the stock does not affect immunity. Great Scot, grown on the trial plots in 1915, was grown at Kew in 1916. The stock was then brought back to the trial plots in 1917, and although it was much weakened no trace of Wart Disease has been found on it. The same stock of Irish Queen has been grown on the trial plots for 4 years and has still proved immune.

Many reports have been received of instances of Wart Disease appearing on varieties which have been classified by the Board as immune. These cases have been carefully investigated, and in every instance it has been found that the disease was present, not on the immune varieties, but on "rogues" of susceptible varieties present amongst the crop. Thus in a case reported from Southport, it was suggested that Wart Disease was present on Great Scot, but upon investigation it was found that the variety on which the disease had appeared was Epicure, which is highly susceptible. Of course, under certain quite artificial conditions, it may be possible to infect an immune variety, but such conditions have yet to be discovered.

The tests which have been carried out at Ormskirk have been very thorough, and it is practically certain that when a variety has passed the test and been declared immune, the immunity will last as long as the variety is in cultivation.

These tests are purely empirical. It is not possible to state whether a certain variety will be immune or not without testing it. Varieties of the diverse characteristics have proved immune. Thus, in the early varieties Sutton's A1 is round with a yellow flesh. Edzell Blue is a round, coloured variety with a white flesh. Snowdrop is a kidney with a white flesh, and Gardiner's No. 1 Seedling is a kidney with a yellow flesh. A large number of varieties which are classified as the Abundance type are immune, but it is impossible to say, so nearly do they resemble each other, whether these are really separate varieties raised from seed or whether they are merely selections from the original Sutton's Abundance. Probably many of them are selections. It is true that many of the immune varieties are white flowered, but this is not general. White City has a lilac flower and Rob Roy a mauve flower. It is possible that further investigations may offer some clue, but at present there is no definite characteristic which will indicate that a variety is immune.

Varieties.—In the following tables the varieties have been divided into three classes :—

(1) *Immune Varieties.*—On these no trace of Wart Disease has been found.

(2) *Non-Immune, or Susceptible Varieties.*—All these have been found to be affected with Wart Disease to a greater or lesser degree of intensity. In some instances practically every plant was attacked, but in other varieties only a few plants were attacked and it was evident that the diseased plants were not "rogues."

(3) *Immunity Doubtful.*—In these varieties one or two plants were affected with Wart Disease, but no definite decision was arrived at as to whether such plants were "rogues." All tubers from doubtful plants were destroyed and "seed" from plants free from disease kept and tested the following season. Thus in the 1915 trials The Ally was classified as being of doubtful immunity. Wart Disease was found on four plants. These were destroyed and the "seed" from the unaffected plants set again in 1916. In this year no disease was found and the variety was therefore classified as immune. A much larger area was planted again in 1917 and the crop was again found to be free from disease, thus confirming the

result of the 1916 trials. On the other hand Seedling No. 6 (Oxley) had three plants diseased in 1915. The variety was treated in the manner stated above, but disease again appeared in 1916 and the variety was therefore classified as susceptible.

Summary of Result of 1915 Trials.—Ninety-four varieties were tested, the " seed " being supplied by some of the leading firms of seedsmen, but a few varieties were also sent for trial by private growers.

TABLE I.—*Immune Varieties.*

Name		Season	Source of " Seed "	Yield per Statute Acre	
	*			Tons	cwt.
A1	W R	Early	Messrs Sutton & Sons	2	13
Ashleaf (variety ?)	W K	,,	A Staffordshire garden	Only a few tubers planted Poor yield	
Resistant Snowdrop	W K	,,	Messrs Dobbie & Co	6	16
Conquest	W R	2nd Early	Messrs Clibrans	6	2
Great Scot	W R	,,	Messrs Sumner & Leivesley	11	10
King George	W K	,,	Messrs Clibrans	10	10
Mr Bresse	C K	,,	Messrs Dobbie & Co	7	10
Snowball	W R	,,	Messrs J Carter & Co	6	16
Southampton Wonder	W R	,,	Messrs Toogood & Sons	9	4
The Duchess	W R	,,	Messrs Dobbie & Co	7	10
Abundance	W R	Late	Messrs Clibrans	11	7
A Seedling	W R	,,	Mr Mee, Manchester	A poor yield.	
Burnhouse Beauty	W R	,,	Messrs Dobbie & Co	10	14
Culdees Castle	W R	,,	Messrs Clibrans	12	14
Favourite	W R	,,	Messrs Dobbie & Co	5	14
Golden Wonder	W R	,,	Messrs Sumner & Leivesley	10	3
Irish Queen	W R	,,	Mr Lomax, Manchester	8	16
Jennie Deans	W O	,,	Messrs Clibrans	9	17
Kerr's Pink	C R	,,	Mr W E Sands	10	1
King Albert	W R	,,	,, ,,	Only small quantity planted.	
King of the Russets	C R	,,	Messrs J Carter & Co	8	11
Langworthy	W K	,,	Mr W E Sands	12	10
Leinster Wonder	W R	,,	,, ,,	10	6
Rob Roy	W O.	,,	A W McAlister	9	9
St Malo Kidney	W.K	,,	Messrs Clibrans	7	0
Shamrock	C R	,,	Mr W E Sands	12	11
The Admiral	W R	,,	Messrs Dobbie & Co	8	12
The Provost	W.R	,,	,, ,,	9	2
What's Wanted	W K	,,	Messrs. Clibrans	10	16
White City	W.K.	,,	,, ,,	11	19

* In the tables

W R = White Round   W K = White Kidney   W O = White Oval.
C R = Coloured Round   C.K = Coloured Kidney   C O = Coloured Oval.

TABLE II.—*Non-Immune Varieties.*

Name.	Season.	Source of " Seed."	Yield per Statute Acre. Clean Tubers.	Yield per Statute Acre. Warted Tubers.
			Tons cwt	Tons cwt.
Avon Queen ..	Early	Messrs. Isaac Poad & Son.	2 3	0 4
Alpha Early ..	,,	Messrs. Dobbie & Co. .	2 10	4 9
Carisbrooke Castle.	,,	,, ,,	—	—
Colonist ..	,,	Messrs. E Webb & Sons.	2 19	2 19
Coral Red Kidney.	,,	Messrs. Toogood & Sons.	—	—
Craigie Early ..	,,	Mr. G. R Sharp, Blackford	1 14	5 18
Dalmeny Early Queen	,,	,, ,,	2 2	7 2
Early Bird ..	,,	Messrs Toogood & Sons	4 18	0 16
Early Favourite (Carter).	,,	Messrs James Carter & Co	2 13	2 8
Ensign Bagley .	,,	per Mr. J. Webb, Haslington.	Only a few sets planted	
Epicure ..	,,	Messrs. Sumner & Leivesley.	2 13	3 0
E. 2 (Sands) ..	,,	Mr W. E. Sands ..	Majority of tubers attacked.	
Exhibition Red Kidney.	,,	Messrs. Dobbie & Co...	1 4	3 1
Express (Webb)	,,	Messrs. E Webb & Sons	1 13	4 8
First Crop ..	,,	,, ,,	2 1	4 2
General Joffre	,,	Mr W. E Sands ..	1 0	6 0
Harbinger ..	,,	Annesley Cottage Garden Assoc	—	—
Midsummer Early	,,	Messrs. Dobbie & Co ..	4 15	40 tubers warted. Warts also on haulm.
Red Seedling (Sharp).	,,	G. R. Sharp, Blackford	0 18	6 0
Royal Standard	,,	Messrs. Toogood & Sons.	5 0	1 15
White Ensign..	,,	,, ,,	—	—
Witch Hill ..	,,	Messrs. Dobbie & Co...	6 18	0 17
Arran Beauty..	2nd Early	,, ,, ..	3 16	7 2
British Queen..	,,	Messrs Clibrans ..	8 14	2 12
Dr Kitchen ..	,,	Messrs Toogood & Sons.	—	—
Ebor	,,	Messrs. Isaac Poad & Sons.	3 18	4 4
Herd Laddie ..	,,	Messrs. Clibrans ..	1 3	3 2
Jolly Roger ..	,,	Messrs. Toogood & Sons.	—	—
New Guardian	,,	Messrs. E. Webb & Sons	5 3	4 4
Raynes Park White.	,,	Messrs. James Carter & Sons.	1 17	7 3

TABLE II.—*Non-Immune Varieties*—continued.

Name.	Season.	Source of " Seed."	Yield per Statute Acre.			
			Clean Tubers		Warted Tubers.	
			Tons	cwt.	Tons	cwt.
Scottish Standard.	2nd Early.	Messrs. G. R. Sharp, Blackford.	1	10	8	4
Sir Edward Carson.	,,	Mr. W. E. Sands ..	Only a few sets planted.			
Arran Chief ..	Late	Messrs. Clibrans ..	1	7	5	4
Balmoral Castle	,,	Messrs. Dobbie & Co.. .	2	14	3	7
Carter's Mainstay.	,,	Messrs. James Carter & Co.	2	11	5	0
Cropwell ..	,,	Messrs. Isaac Poad & Sons.	2	6	4	17
Dalmeny Perfection.	,,	Mr. G. R. Sharp, Blackford.	2	3	7	8
Dalmeny Regent	,,	,, ,,	4	18	7	1
Iron Duke ..	,,	Messrs. Sumner & Leivesley.	2	12	3	17
Isis	,,	Messrs. Dobbie & Co.. .	10	17	1	17
King Edward ..	,,	Messrs. Sumner & Leivesley.	2	6	3	17
Mighty Atom ..	,,	Messrs. E. Webb & Sons.	1	19	7	6
Prosperity ..	,,	,, ,,	1	2	3	18
Red Prince ..	,,	Mr. Cawdwell ..	Only a few sets planted.			
Royal Salute (Poad).	,,	Messrs. Isaac Poad & Sons	5	15	4	10
Scottish Farmer	,,	G. R. Sharp, Blackford	4	8	6	9
Stourbridge Glory.	,,	Messrs. E. Webb & Sons.	2	4	3	0
Summit ..	,,	Mr. W. R. Farish, Dumfries.	3	0	10	8
Tremendous ..	,,	Messrs. Toogood & Sons	7	5	2	15
Tribute ..	,,	,, ,,	2	5	3	15
Up-to-Date ..	,,	Messrs. Sumner & Leivesley.	3	4	4	7

TABLE III.—*Immunity Doubtful.*

Name.	Season.	Source of " Seed."	Remarks.
Crown Jewel .	Early	Messrs Toogood & Sons.	Three plants were affected. Two of these were apparently " rogues," but the third could not be determined.
Edzell Blue ..	,,	Messrs. Dobbie & Co.	Four plants were affected with Wart Disease. In one case disease on the haulm.
Mauve Queen	2nd Early.	,, ,,	Trace of Wart Disease on base of one haulm only. No tubers affected.
Secundus ..	,,	,, ,,	Two plants affected.

TABLE III.—*Immunity Doubtful*—continued.

Name.	Season.	Source of " Seed."	Remarks
Seedling No. 6 (Oxley).	2nd Early.	Mr. C Oxley, Leicester.	Three plants affected, the tubers of which did not appear to be true to type.
The Ally ..	,,	Mr. G. R Sharp, Blackford.	Four plants affected.
Dominion ..	Late	Messrs Isaac Poad & Sons.	Two plants affected. These were probably " rogues." A very good crop.
Five-mile Town	,,	Messrs. J. Carter & Co	This variety was badly infected with " leaf curl." Probably immune to Wart Disease.
Irish Hero ..	,,	Mr W E Sands..	Two plants affected. These appeared to be true to type.
Punta Arenas	,,	Messrs Dobbie & Co.	Disease on one plant, but there were undoubtedly two stocks in " seed " supplied.
Success ..	,,	Messrs Toogood & Sons.	One plant affected.
Table King ..	,,	Messrs E Webb & Sons	Three plants affected, two of which appeared to be true to type.

Summary of Results of 1916 Trials.—In this year 159 varieties were planted. These included all the varieties which proved immune in the 1915 trials, and also those varieties of which the immunity was doubtful. In no instance was Wart Disease found on those varieties which resisted the disease in 1915. Of those varieties of which the immunity was doubtful, the following proved immune are now included in the list of Immune Varieties :—Crown Jewel, Dominion, Edzell Blue, Five-mile Town, Mauve Queen, Secundus, Table King (Webb), and The Ally.

TABLE I.—*Immune Varieties.*

Name.	Season.	Source of " Seed."	Yield per Acre.
			Tons. cwt.
Ashleaf (variety ?).. W.K.	Early	A Staffordshire Garden..	0 18
Coronation Kidney W.K	,,	Mr. C. Finch	—
Crown Jewel .. W.R	,,	Trial Plots, 1915 ..	(3) 3 2
Edzell Blue .. C.R.	,,	,, ,, ..	7 10
,, .. C.R.	,,	Messrs. Guthrie Bros. ..	7 10
Potts' Profit .. W.K.	,,	A Shropshire Garden ..	1 3
Adirondack .. C.R.	2nd Early.	Messrs. Toogood & Sons	4 18
Aberlady Early .. W.R.	,,	Lancashire C C. Farm ..	3 13
Border Queen .. C.K.	,,	Messrs. Toogood & Sons	1 10
,, .. C.R.	,,	Mr. A. W. McAlister ..	5 5

TABLE I.—*Immune Varities*—continued.

Name		Season	Source of " Seed "	Yield per Acre	
				Tons	cwt
Cardinal	C K	2nd Early	Messrs J Carter & Co	4	8
,,	C K	,,	Mr A W McAlister	—	
Mauve Queen	C R	,,	Trial Plots, 1915	2	19
Dean	C R	,,	Messrs Toogood & Sons	—	
Sir Douglas Haig	W R	,,	Mr W E Sands	10	9
Secundus	W R	,,	Trial Plots, 1915	6	16
,,	W R	,,	Messrs Dobbie & Co	6	12
The Ally	W R	,,	Trial Plots, 1915	11	0
Climax	C R	Late	Messrs Toogood & Sons	2	1
,,	C R	,,	Messrs Dobbie & Co	4	9
Crimson Beauty	C O	,,	Mr A W McAlister	5	12
Dominion	W R	,,	Trial Plots, 1915	10	4
Flour Ball	C R	,,	Messrs. Cross & Co	5	12
Heather Bountiful	W R	,,	Messrs Halsall & Erricks	—	
Improved Favourite	W R	,,	Messrs Dobbie & Co	7	2
Laird	W R	,,	Messrs Cross & Co	7	8
Lochar	W R	,,	,,	12	6
,,	W R	,,	Messrs Dobbie & Co	10	7
,,	W R	,,	Mr A W McAlister	10	12
Rector	C R	,,	Messrs Guthrie Bros	11	3
,,	C R	,,	Messrs Cross & Co	11	3
Schoolmaster	W R	,,	,, ,,	3	19
,,	W R	,,	Mr A W McAlister	3	15
Supreme	W O	,,	Lancashire C C Farm	4	10
Templar	W R	,,	Messrs Guthrie Bros	11	4
,,	W R	,,	Messrs Cross & Co	12	0
Tinwald Perfection	W R	,,	Mr S T Farish	9	0
20th Century	W R	,,	Messrs Dobbie & Co	6	16
Five-mile Town	W R		Trial Plots, 1915	4	19
,, ,,	W R		Messrs J Carter & Co	4	9
Gardiner's No 1	W K		Mr J Gardiner, Perth	2	17
Garton's No 17			Messrs Garton	4	12
Garton's No 32			,,	2	15
Garton's No 22			,, ,,	3	8
St Andrew			Messrs Dobbie & Co	—	

TABLE II.—*Non-Immune Varieties.*

Name	Source of " Seed "	Clean		Warted	
		Tons	cwt	Tons	cwt
Advancer	Messrs Jas Carter & Co	1	7	2	10
Ajax	Mr Jack	0	4	1	16
Bell's Seedling	Annesley Woodhouse	3	19	0	8
Beauty of Hebron	Messrs Clibrans	1	12	0	16
Centenary	Lancashire C C Farm	2	3	0	16
Chapman, The	Messrs Dobbie & Co	5	0	3	8
Cigarette	Mr McAllister	4	0	0	5
Coleen	Lancashire C C Farm	2	14	1	16
Dalhousie Seedling	Messrs Dobbie & Co	2	14	2	8
Dover Castle	Lancashire C C Farm	3	10	0	12
Duke of York	Messrs Clibrans	1	12	3	11
,,	Messrs Dobbie & Co	2	4	2	6
Edgecote Purple	Mr McAlister	1	15	1	6
Eightyfold	Messrs Dobbie & Co	2	1	1	14

TABLE II.—*Non-Immune Varieties*—continued.

Name.	Source of " Seed."	Clean.		Warted.	
		Tons	cwt.	Tons	cwt.
Emperor	Messrs Jas. Carter & Co	2	2	3	8
Red	Mr Jack	0	2	1	4
Excelsior	Messrs Jas. Carter & Co.	2	14	4	18
Factor, The ..	Messrs. Dobbie & Co. ..	2	2	2	4
Gardener's No. 2 ..	Mr. James Gardener ..	2	8	0	15
,, No. 3 ..	,, ,, ..	3	15	0	7
Gladiator ..	Lancashire C C Farm ..	1	9	0	16
Glamis Beauty ..	Mr Jack	5	16	4	9
Goldfinder ..	Messrs. Jas. Carter & Co.	2	14	4	14
Guthrie's 75 ..	Messrs Guthrie Bros. ..	4	13	1	9
Imperator ..	Messrs. Jas. Carter & Co.	1	8	2	5
Ivanhoe	Messrs Toogood & Sons .	1	1	1	8
J.W.V. 100 ..	Messrs. Dobbie & Co. ..	*		*	
Leda	Mr. McAlister	1	1	0	10
Liberty	Messrs A. Dixon & Sons	5	5	3	3
Lincluden ..	Mr McAlister	1	15	0	18
Longkeeper ..	Messrs Jas Carter & Co.	3	3	6	14
Mein's Early Round	Mr Massey	*		*	
Midlothian Early .	Messrs Dobbie & Co ..	2	1	2	19
Northern Star ..	Mr McAlister	2	1	0	19
President ..	Lancashire C C. Farm ..	—		—	
Prolific	Messrs. Dobbie & Co ..	6	8	1	12
Red Skin ..	Messrs Guthrie Bros ..	2	14	1	16
Reading Russet ..	Mr. W. A McAlister ..	2	3	0	10
Ringleader ..	Lancashire C C. Farm ..	1	1	0	7
Royal Kidney ..	Messrs. Clibrans	4	11	1	12
Royalty	Messrs. Jas. Carter & Co.	2	14	4	15
St. Giles	Messrs. Dobbie & Co ..	*		*	
Satisfaction ..	Lancashire C.C. Farm ..	1	3	0	10
Seedling No. 2 ..	Messrs. A. Dixon & Sons	3	12	4	8
Seedling	Mr S. T. Rosbotham ..	Mixed			
,, ...	,, ,, ..	Mixed			
Sharpe's Express	Messrs. Dobbie & Co ..	1	10	2	10
Sir John Llewellyn	,, ,, ..	2	17	1	3
Stirling Castle ..	Lancashire C.C Farm ..	2	10	0	16
Table Talk ..	,, ,, ..	4	1	0	18
Triumph	Messrs. Toogood & Sons	1	1	0	2
Unnamed	per Mr. Oldham	1	10	0	7
,, ...	Mr. Rimmer	*		*	
Skerries	Mr. C. Finch	0	4	0	16
Victor	Messrs. Toogood & Sons .	2	14	0	4
Vitality	Messrs. Cross & Co ..	1	16	0	9
Warwick Castle ..	Lancashire C.C Farm ..	2	10	0	18

* Only a small quantity planted.

TABLE III.—*Immunity Doubtful.*

Name.	Source of " Seed."	Remarks
Coronation ..	Messrs Toogood & Sons..	1 Plant with Wart Disease, Probably a " rogue."
Gell's Seedling..	Mr Gell	2 Plants with Wart Disease.
Goldseeker ..	Erricks	Several obvious " rogues " present with Wart Disease.

TABLE III.—*Immunity Doubtful*—continued.

Name	Source of " Seed."	Remarks.
Irish Hero ..	Mr W. E. Sands ..	12 Tubers with Wart Disease.
,, ..	Trial Plots, 1915 ..	No Wart Disease seen.
Leicester Seedling	,, ,, ..	1 Tuber with Wart Disease
Paragon ..	Messrs. Toogood & Sons..	2 Plants with Wart Disease
Punta Arenas ..	Trial Plots, 1915 ..	No Wart Disease
,, ..	Messrs. Dobbie & Co ..	2 Stocks present
St. Cuthbert ..	,, ,, ..	1 Tuber with Wart Disease
Unnamed ..	Messrs. Barr & Sons ..	Wart Disease seen in haulm, but none found in tubers
Winton Abundance.	Mr. J. Ashcroft	Wart Disease on 3 tubers.
W T. W. ..	Messrs. Dobbie & Co. ..	—

Summary of Results of 1917 Trials.—In 1917, 140 varieties were planted. These included all the chief Immune Varieties planted in the previous trials. All those varieties the immunity of which was doubtful in 1916 were again tested.

TABLE I.—*Immune Varieties.*

Name	Season	Source of " Seed "	Yield per Acre		
			T	cwt.	qr
America .. W R	Early	Messrs Dobbie & Co ..	6	12	1
Early Border .. W.R.	,,	Mr. P. Ray	5	7	0
Gell's Seedlings.. W K.	,,	Trial Plots, 1916 ..	5	7	0
Lang's Early Prolific W.R.	,,	Mr G Barnes	9	5	3
A Seedling (Great Scot ?) W.R.	2nd Early	Mr J. L Clucas ..		—	
Conqueror .. W R.	,,	Mr W Halsall	10	14	1
Crimson Beauty .. C K.	,,	Mr A W. McAlister ..	6	13	1
Seedling No. 30 . C.O.	,,	Messrs. Isaac Poad & Sons	7	2	3
Seedling No. 38 .. W.R.	,,	,, ,,	9	1	0
Champion .. W R.	Late	Department of Agriculture, Ireland.	11	16	2
Goldseeker .. W.K.	,,	Trial Plots, 1916 ..		—	
Kerr's New White W.O.	,,	Messrs. Dobbie & Co. ..	8	11	3
Majestic .. W.K.	,,	Messrs Isaac Poad & Sons	11	15	3
,, .. W K	,,	Mr. J. L. Clucas ..		—	
,, .. W K	,,	Messrs. Dobbie & Co. ..	13	11	2
Priory Queen .. W.O.	,,	,, ,, ..	10	7	1
Scotch Pride .. W.O.	,,	Messrs. F & N. Lythgoe .	7	6	2
Seedling No. 1 .. W.R.	,,	Mr S. T. Farish ..	7	2	3
,, No. 4 .. W.R.	,,	,, ,, ..	7	17	1
,, No. 3 .. W.K.	,,	Mr. A. W. McAlister ..	9	1	0
,, No. 41 .. C.R.	,,	Messrs. Isaac Poad & Sons	7	8	3
Unnamed .. W.O.	,,	Mr. James Alcock ..	4	5	3

TABLE II.—*Non-Immune Varieties.*

Name		Season	Source of " Seed "	Yield per Acre					
				Clean			Warted		
				T	c	q	T	c	q
Cetewayo	C K	Early	Mr H V Taylor	4	3	0	1	0	1
Dunnottar Castle	W O	"	Messrs Sutton & Son	Poor Yield			Traces Wart Disease		
Early Victory	W K	"	Mr C Oldham	4	0	2	0	3	2
May Queen	W K	Early	Mr J L Clucas	6	10	1	0	1	3
Ninetyfold	W K	"	Mr A W McAlister	4	14	3	1	3	1
Red Kidney	C K	"	Messrs Dobbie & Co	7	3	0	0	8	0
Riley's Early	W O	"	Mr W Halsall	5	2	3	2	11	0
Seedling No 12	W K	"	Messrs Isaac Poad & Sons	17	12	2	0	9	2
Sharpe's Express	W K	Early	Mr J L Clucas	7	4	3	1	5	0
Sharpe's Victor	W K	"	Mr A W McAlister	1	19	1	0	1	1
Thuringen.	W R	"	Messrs Dobbie & Co	5	0	0	0	7	1
Eclipse	W K	2nd Early	Mr J L Clucas	3	15	0	1	3	3
No 10 M T	W K	"	Messrs Dobbie & Co	4	5	3	0	3	2
No 22 M T	W R	"	" "	3	0	3	1	2	1
Pink Eyes	C K	"	Mr A W McAlister	3	3	0	2	1	3
Queen Mary	W K	"	Messrs Isaac Poad & Sons	4	5	3	1	15	3
Seedling No 1	W R	"	Mr A W McAlister	7	2	3	0	19	0
Seedling No 2	W O	"	Mr S T Farish	3	11	2	1	8	2
Seedling No 7	W R	"	Mr A W McAlister	8	10	3	1	18	0
Sutton's Early Regent	W R		" "	8	2	2	1	1	2
Table King	W R	"	Mr C H Oldham	3	11	3	0	12	2
Unnamed	C R	"	Messrs Dobbie & Co	5	7	1	0	17	3
Wilson's Early Red Kidney	C K	"	Mr J T Travis		—			—	
Barshell No 10	W O	Late	Mr A W McAlister	8	0	3	1	15	3
Barshell No 9	W K	"	" " .	3	13	3	5	14	1
Bobby Burns	W R	"	Mr W R Farish ..	12	2	3	2	6	2
Bruce, The	W O	"	Mr R Rothwell	4	0	2	1	7	0
Bummy No 1	W R	"	Messrs Sumner & Leivesley	2	17	0	6	14	0
Champion Pink	C R	"	Mr W R Farish ..	4	0	2	1	8	2
Chelmsford No 1	W O.	"	Messrs Dobbie & Co	2	10	0	2	3	3
General .	W R	"	Mr J L Clucas	7	13	2	2	10	0
Irish Chieftain	W R	"	Messrs Barr & Sons	9	13	3	0	3	2
Peerless Rose	C K	"	Mr Ashley	1	6	0	0	13	2
Seedling S 1	W R	"	Mr R Whitehead ..	6	15	0	3	11	2
" S 2	W R	"	" " ..	6	3	3	2	7	3
" S 3	W K	"	" " ..	2	7	3	0	19	0

TABLE II.—*Non-Immune Varieties*—continued.

Name.	Season.	Source of " Seed."	Yield per Acre.	
			Clean.	Warted.
			T. c. q.	T. c. q.
Seedling No.3. W.O.	Late.	Mr. S. T. Farish ..	3 11 2	1 4 1
Unnamed .. W.R.	,,	Mr. Dunton	7 3 0	2 3 0
,, .. C.K.	,,	Mr. R. Catterall ..	3 6 0	1 12 1
,, ...	?	Mr. Malcolm	—	—
St. Cuthbert ..	—	See 1916 Report ..	—	—

TABLE III.—*Immunity Doubtful.*

Name.	Season.	Source of " Seed."	Remarks.
Ideal .. W K	2nd Early.	R.H.S. Gardens, Wisley.	—
Crown .. W R	Late	Mr. J. L. Clucas ..	1 Plant with Wart Disease.
Isis .. .. W R	,,	Messrs. Dobbie & Co.	1 Tuber with Wart Disease
Seeding No. 5 W O.	,,	Mr W. R. Farish ..	2 Tubers with Wart Disease.
White Lady W O	,,	Mr. Geo. Monro ..	3 Tubers with Wart Disease.
W T W.	—	Messrs. Dobbie & Co.	1 Tuber with Wart Disease.

Results of Planting Susceptible Varieties on Infected Land.—These trials show clearly the disastrous results of planting susceptible varieties on land infected with Wart Disease. The accompanying illustration shows two plants, one of Arran Chief and the other Great Scot, which were growing side by side on the same plot. On the Arran Chief there is not a single tuber, but merely a mass of Wart, whereas the Great Scot shows a crop of sound tubers. Arran Chief is a highly susceptible variety and on no account should it be planted in those districts where Wart Disease is at all prevalent.

Reference to some of the foregoing tables will show examples of the loss in planting susceptible varieties. These varieties may be very excellent in districts free from Wart Disease, but in infected areas they can only lead to disappointment. Thus, in the 1915 trials the variety Summit gave a total yield of 13 tons 8 cwt. per acre, but of these 10 tons 8 cwt. were badly warted. Scottish Farmer gave a total yield of 10 tons 17 cwt. per acre, and of these 6 tons 9 cwt. were diseased. It will be noticed that in the lists of susceptible varieties are included many of the popular commercial varieties, such as King Edward, Up-to-Date, Arran Chief, British Queen, President and others. However successful such varieties may be on non infected land, the planting of them on infected soils can only lead to the most disastrous results. It will be observed that the total yield of clean and warted tubers of many of the varieties in these lists is very low. Some of the varieties undoubtedly do yield excellent crops on clean land, but the yield on badly-infected soil is poor. This is due to the fact that the large masses of Wart present earlier in the season have all decayed at the time of lifting. Thus Ajax, a variety which cropped heavily in Perthshire in 1915, gave a total yield of only 2 tons per acre, and of these 1 ton 16 cwt. were warted tubers. The masses of Wart seen on this variety in August had all decayed at lifting time. It is unfortunate that many of our popular early varieties are susceptible to the disease. It will be observed that Duke of York, Midlothian Early, Sharpe's Express and Sharpe's Victor are all included in the lists of non-immune varieties.

NOTES ON THE IMMUNE VARIETIES.

Early Varieties.—A large number of early varieties have been tested, but only a few have proved immune. Varieties capable of taking the place of Ninetyfold and Epicure for farm cultivation have still to be found.

1. *A1* (Sutton).—An early with an upright haulm and rather small, crinkled leaves. Flowers are seldom, if ever, formed. The tubers are round, of medium size, with a white skin and yellow flesh. Quality good. It crops moderately well and is suited for garden cultivation.

2. *Early Prolific* or *Early Border.*—Similar to Sutton's A1.

3. *Resistant Snowdrop* (Dobbie).—An early with a spreading haulm, not very vigorous The tubers are kidney with white skin and white flesh. It crops well and its quality is fairly good. The stocks of this variety are very small.

4. *Edzell Blue.*—An early with a strong, spreading haulm. The tubers are round, the skin coloured, and the flesh a pure white. It crops well and the quality is excellent. Highly recommended for gardens and allotments, but its colour may possibly prevent it becoming a popular market variety. It is not a new variety, but the recent discovery of its immunity has brought it into prominence.

Tuber of Arran Chief, showing Wart Disease.

Root of Great Scot with excellent crop of clean tubers, and Arran Chief with no tubers. *Both plants from same plot.*

5. *Seedling No.* 1. (Gardiner).—This is a very promising first early which has not yet been named. It has a medium upright haulm with medium, green, crinkled leaves. The tubers are kidney with white skin, and the flesh of a pale yellow colour.

6. *Crown Jewel* (Toogood).—An early variety with dwarf habit. The stalk is green, and the leaves are green, small and glossy. The tubers are round with white skin and white flesh. There are a large number of tubers per root but they are rather small.

Second Early Varieties.—There are several early second immune varieties which can be thoroughly recommended both for heavy cropping and freedom from disease.

7. *King George* (Butler).—A variety with a fairly strong, spreading haulm. The flowers are white. The tubers are elongated with shallow eyes. In many respects the variety resembles British Queen. It is a heavy cropping variety, but the quality is not very good. This variety, if sprouted before planting, will be ready for lifting quite as early as Epicure or Ninetyfold.

8. *Great Scot* (McAlister).—One of the best of the second early varieties. It is later than King George, and might even be regarded as an early maincrop. The haulm is tall, upright, and vigorous The foliage is dark green and glossy. The flower is white. The tubers are round with moderately deep eyes. The skin and flesh are white. It is a very heavy cropping variety, and the quality is good.

9. *Sir Douglas Haig* and *Southampton Wonder.*—Are both similar to Great Scot.

10. *The Ally.*—Haulm vigorous and spreading. Flower white The tubers are usually oval but the shape varies. The skin and flesh are white ; eyes shallow. It is a very heavy cropping variety, but the quality is only fair.

Amongst the other immune second early varieties are Conquest, Mr. Bresse, Border Queen, Snowball, and The Duchess.

Late or Maincrop Varieties.—11. *Abundance* (Sutton).—An early maincrop, with strong, upright haulm and dark green, glossy foliage. The flowers are white. The tubers are round to oval, and flat. The skin and flesh are white and the eyes shallow. The cooking quality is good. The variety crops well, but it is rather liable to the common potato disease (*P. infestans*). Other varieties which resemble Abundance in most respects are Culdees Castle, King Albert, The Provost, Crofter, Jennie Deans, Favourite, Priory Queen, Scotch Pride, 20th Century, and The Admiral.

12. *Burnhouse Beauty.*—This bears a close resemblance to the Abundance group, but its flowers are lavender and white.

13. *The Laird* (Davie).—A maincrop with a vigorous haulm. The tubers are round; the variety crops well on certain soils in many Midland districts.

14. *Langworthy* (Niven) and *What's Wanted.*—These two varieties are practically indistinguishable from each other, and the following description applies equally to both: A late maincrop with tall, vigorous, upright haulm. The leaves are slightly crinkled. The flowers are mauve, tipped white. The tubers are kidney-shaped, often tapering at the "heel." The skin and flesh are white and the eyes shallow. It crops well on some soils, but it requires a long season of growth and good cultivation. If possible, the seed should be sprouted. The quality is excellent.

15. *Golden Wonder* (Brown).—The haulm, foliage and flowers are practically identical with those of Langworthy. The tubers are kidney shaped, often tapering at the "heel." The skin has a characteristic yellowish russety-brown tinge. The flesh is white and the eyes shallow. The quality is excellent. The variety crops well on some of the soils of Lancashire, and it is one of the best late-keeping varieties. It requires a long season of growth, and if possible the "seed" should be sprouted. Not suited for heavy soils.

White Round or Oval Section.—16. *Rob Roy* (McAlister).—An early maincrop with a tall, vigorous haulm, inclined to spread. The flowers are mauve. The tubers are flattish oval, with very shallow eyes. In size they are medium. The variety cropped much better in the 1917 trials than in the two previous seasons.

17. *The Lochar* (Farish).—Haulm of medium height and vigour, upright, with fine branches. The foliage has a characterestic delicate shade of green. The tubers are round, with eyes of medium depth. The skin is white, with a faint tinge of pink, especially around the eyes. The flesh is white. It yields a heavy crop of medium-sized tubers. Appears fairly resistant to common potato disease (*P. infestans*). In the 1917 trials this variety was practically a failure. The majority of the haulms were dwarfed and curled, but it is probable that this was due to the "seed" having been chilled during the very cold weather in February and March.

18. *Heather Bountiful.*—Resembles Lochar.

19. *Leinster Wonder* (Sands).—A very late main crop, with a tall, upright, vigorous haulm and dark green foliage. The flowers are white, borne on long stalks. The tubers are round, with a white skin sometimes showing a faint trace of pink. The eyes are shallow. The flesh is white, tinged lemon. The variety crops well and appears to be fairly resistant to common potato disease (*P. infestans*).

20. *The Templar* (Wilson).—A late variety with a very vigorous tall, upright haulm and dark green foliage. The flowers are white and very numerous. The tubers are flattened oval, with eyes of medium depth. The skin is white and the flesh white. The variety yields a heavy crop of medium-sized tubers of very good quality. It appears to be fairly resistant to ordinary potato disease (*P. infestans*).

Coloured Round or Oval Section.—21. *Kerr's Pink*.—A late variety with a very strong, tall, upright haulm. The flowers are white and usually numerous. The tubers are round, with a light pink skin. The colour is so slight that it will not detract from its market value. The eyes are usually of medium depth, but on some tubers they are deeper. The flesh is white and the quality excellent. The variety yields a very heavy crop of good-sized tubers. It also appears to be fairly resistant to ordinary potato disease (*P. infestans*).

22. *The Rector* (Wilson).—Tall, upright, strong haulm, with darkish green foliage. Flowers rose-purple, tipped white. The tubers are round, with rather deep eyes. The skin is red and the flesh white. It yields a heavy crop of medium-sized tubers which are of excellent quality. The variety appears to be highly resistant to ordinary potato disease (*P. infestans*). Its colour will probably detract from its value as a market potato, but it can be thoroughly recommended to growers who require a good-keeping potato of first-class quality.

23. *Irish Queen* (Sands).—A main crop, with a tall, vigorous, upright haulm, and large, medium green leaves. The flowers are purple. The tubers are round, with a pink skin and very deep eyes. The crop is fairly heavy, and the variety will keep late.

24. *Shamrock* (Sands).—A very late variety, with moderately vigorous, tall haulm, which becomes spreading at end of season. The foliage is dark green. The flowers are white and usually numerous. The tubers round, rather rough in shape, with a reddish-pink skin. The eyes are numerous and deep and the flesh white.

25. *White City* (Sutton).—A variety with tall, vigorous upright haulm, usually with three or four strong branches. The foliage is darkish green. The flowers are lilac tipped a lighter shade. The tubers are long, flat kidney-shaped, and tapering, with very shallow eyes and a russet skin. The flesh is white and the quality good. The variety crops well. Unfortunately many of the stocks of this variety are very mixed, generally with a smooth-skin variety very susceptible to Wart Disease.

26. *St. Malo Kidney.*—The haulm is tall, upright and strong, and the foliage dark green. The tubers are kidney-shaped and large, with shallow eyes. The skin and flesh are white. The variety crops well, but it is advisable to sprout the " Seed " before planting.

27. *Dominion* (Poad).—A late variety with a tall, vigorous, somewhat spreading haulm, with dark-green foliage. The flowers are white. The tubers are flattened oval, often elongated, in many respects resembling the tubers of the Up-to-Date. The skin and flesh are white and the eyes shallow. The variety crops well.

It is unfortunate that the stocks of this variety have in some way become badly mixed with Arran Chief. If the stocks could be purified, the variety could certainly be recommended.

28. *Majestic* (Finlay).—This is a very excellent early main-crop variety. The haulm is of medium height, spreading, and moderately vigorous. The leaves are smooth and of a medium green colour. The tubers are kidney, somewhat irregular; eyes shallow; skin white; flesh white. The only criticism which can be offered on this variety is that it is rather weak in the haulm, but in spite of that it crops well.

Several other seedlings and new selections have proved immune in the 1917 trials, but a description of these must be deferred until they have been grown another season.

NOTE.—*The foregoing article is issued in the form of Food Production Leaflet, No. 21, copies of which may be obtained gratis and post free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.*

YIELDS OF GRASS FROM VARIOUS BASIC SLAGS:

THE EFFECT OF BASIC SLAGS OF VARIOUS DEGREES OF SOLUBILITY UPON THE CROPS OF GRASS YIELDED BY A HEAVY BOULDER CLAY SOIL IN EAST SUFFOLK.[*]

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EXPERIMENTS to test basic slag of various degrees of solubility have been carried out during the past four seasons on a field at the Experiment Station of the East Suffolk County Education Committee near Saxmundham.

The soil is a poor clay, containing abundant chalk nodules; the climate is dry, and the district is one in which the yields of meadow hay are small.

Soil.—An analysis of the soil of an adjoining experimental field of similar type of soil, made at Cambridge some years ago, gave the following results :—

Stones 2·50 } per cent. in air dried soil
Water 3·62 }

	Per cent in Soil Dried at 100° *C*
Organic matter and loss on ignition	5·79
Nitrogen	0·178
Lime (as carbonate of lime)	2·84
Phosphoric acid sol in strong hydrochloric acid	0·248
,, ,, ,, 1 per cent citric acid	0·0243
Potash sol. in strong hydrochloric acid	0·71
,, ,, 1 per cent. citric acid	0·002

Dr. E. J. Russell, F.R.S., Rothamstead Experimental Station, recently made a mechanical analysis of the soil of this field, and with his permission the following figures are reproduced :—

	Plot Unmanured since 1899 *Per cent*	*Plot receiving* 2 *cwt of Superphosphate yearly since* 1899 *Per cent*
Fine gravel	0·2	0·7
Coarse sand	40·8	38·6
Fine sand	16·0	18·1
Silt	6·9	5·5
Fine silt	7·9	6·6
Clay	15·5	16·9
Loss on ignition (less moisture)	5·1	5·2
,, solution	5·6	6·3

In spite of the tenacity and impervious nature of the soil it (in common with most of the chalky, boulder clay soils of Mid-Suffolk) crumbles down nicely after a frost, and a fair tilth can then be obtained if care is taken not to work it when wet.

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[*] A paper read before the Agricultural Organisers Committee of the Agricultural Education Association in London, 30th July, 1917.

The soil is, however, much poorer than the average heavy clay of Suffolk. For this reason it is particularly well suited to manurial tests. It is extremely responsive to basic slag. In the same field in which these tests were carried out are a series of grass plots on which manurial trials have been conducted since 1901, and the following figures taken from the results obtained show the suitability of the soil for tests with slag :—

Treatment.	*Average Weight of Hay,* 11 *years to* 1913. (*Grazed* 1908) *cwt.*
Plot 4 —No manure through entire period ..	9½
Plot 1A.—10 cwt. basic slag, 1901, 1907, and 1912	28

Part of the field is old grass, whilst another part consists of land laid down to permanent grass in 1901.

Seasons.—Whilst the experiment was in progress the seasons were as follows :—

1914.—Dry.

1915.—Dry, but a good rain in May. A very heavy crop of aftermath.

1916.—A very good year for hay.

1917.—Very dry during the growing period. The yield of hay on the entire field in question was so small that it was not worth cutting. There were only a few bents or flowering stems of grass. These occurred uniformly over all the plots.

The failure of the hay crops in 1917 was so complete that a word of explanation is desirable.

During 1916—a very good hay year—the rainfall between 20th April and 20th June at the Experiment Station was 3·25 in. In 1917, the rainfall for the same period was only 0·87 in. On this cold, heavy land, growth does not begin until late in April, and in 1917 the drought commenced before the grass had begun to grow. All the manures were sown in November, 1913.

Scheme of Experiments.—The scheme suggested by the Agricultural Education Association was that 40 lb. of phosphoric acid should be applied per acre to each plot. The object in suggesting this small quantity probably was that the plants might be suffering from lack of phosphate and, consequently, they might be ready to utilise all that was available.

The writer decided to carry out the suggested scheme, but also to include other experiments in which a larger quantity of slag was applied per acre.

Composition of the Slags referred to.—The slags were obtained and distributed by the Agricultural Education Association.

The analyses given in brackets were supplied with the slags by the vendors. At the time the experiment was started the writer hardly anticipated such striking results, and hence did not have a special analysis made of each lot of slag; samples were however, kept for reference. The writer was also under the impression that all samples had been analysed by the Agricultural Education Association before they were sent out. Subsequently, when the results appeared to be of such great interest, inquiry showed that some uncertainty existed as to the analyses of the samples in question. Analyses of the samples kept were therefore desirable, and Mr. G. S. Robertson, M.Sc., of Chelmsford, was good enough to undertake them.

In the table given below the original statement of analysis on which the quantities of phosphoric acid applied per acre were based is given above in brackets, and the actual analysis below. It will be seen by comparing the two analyses in each case, that this introduces a slight error.

	Citric Soluble Phosphates	*Total Phosphates*	*Percentage Citric Solubility of the total Phosphates present.*	*Fineness.*
SAMPLE A.—	*Per cent.*	*Per cent*		
Low percentage of total phosphate (high citric solubility)	(20·83) 19·86	(21·63) 20·83	(96) 95·3	(94·5)
SAMPLE B—				
Low percentage of total phosphate (low citric solubility)	(5·56) 9·55	(22·61) 20·86	(24) 45·7	(84·9)
SAMPLE C—				
High percentage of total phosphate (high citric solubility)	(34) 34 50	(37) 38·98	(92) 90·0	(85·6)
SAMPLE D—				
Low percentage of total phosphate (fairly high citric solubility)	(14·3) 15·46	(22) 18·72	(65) 82·2	— —
SAMPLE E—				
Ground Belgian phosphate ..	—	44·7	—	—

Weighing of Plots.—Owing to the large number of plots involved it was considered that the most reliable results would be obtained if the crop was cut when it was dry to the boots of a person walking through it, and weighed immediately. In this way errors due to showery weather were obviated.

In many cases the grass was subsequently weighed in the form of hay, and it was found that on an average 2½ cwt. of green grass weighed 1 cwt. when made into hay under first class conditions. On this basis an idea can be obtained of the weight of hay per acre.

Experiment I.—Old Grass Land. 40 lb. phosphoric acid per acre of various slags sown in November, 1913. Plots in Duplicate $\frac{1}{40}$th acre each.

Cwt. of Green Grass per acre on the Duplicate Plots.

—	1914.		1915. 1st Crop		1915. 2nd Crop		1916.		1917.		Total.	Average Yields of Green Grass per acre per annum for the Four Years.
	South Duplicate	North Duplicate.	South Duplicate.	North Duplicate.	South Duplicate.	North Duplicate.	South Duplicate.	North Duplicate.	South Duplicate.	North Duplicate.		
No manure	21½	23	33	28½	19¼	20	64½	82½	Practically nil (see note on weather for 1917).		Cwt. 292¼	Cwt. 36½
Slag A (low percentage of total phos., high sol.)	24	30	52½	57	35	38½	86	105¾	,,		428¾	53½
Slag B (low percentage of total phos., low sol.) ..	23¼	25½	36½	32¾	23½	25	71¾	80	,,		318¼	40
Slag C (high percentage of total phos., high sol.) ..	22	28¼	47¾	52½	44½	41½	79	95	,,		410½	51¼
Slag D (low percentage of total phos., fairly high sol.)	23½	25½	41½	52¾	33	27	73	90¾	,,		367	46
Phosphate E (Ground Belgian phosphate) ..	21½	22	25¾	40	30¾	14¼	65¾	79¼	,,		299¼	37½

Experiment II.—Grass Land seeded down in 1901. 40 lb. phospheric acid per acre of various slags sown in November, 1913. Plots in duplicate $\frac{1}{40}$th acre each.

Cwt. of Green Grass per acre on the Duplicate Plots

—	1914.		1915.		1916.		1917.		Total.	Average Yields of of Green Grass per acre per annum for the Four Years.
	South Duplicate.	North Duplicate.	South Duplicate.	North Duplicate.	South Duplicate.	North Duplicate.	South Duplicate.	North Duplicate.		
									Cwt.	Cwt.
No manure	14½	8½	14½ (= 6 cwt hay) *	9½	59¼	64	Practically nil		170	21¼
Slag A (low percentage of total phos., high sol.).	16½	20¾	30¾ (= 12½ cwt. hay) *	24½	77	90½	,,		260	32½
Slag B (low percentage of total phos., low sol.).	16	13½	18¾ (= 7¾ cwt hay).*	18¼	72½	60	,,		199	25
Slag C (high percentage of total phos., high sol.).	18¼	15¾	32 (= 12¾ cwt. hay).*	21½	67	74¾	,,		229¼	28½
Slag D (low percentage of total phos., fairly high sol.).	12¾	20	16½ (= 6½ cwt. hay).*	25	79	62½	,,		215¾	27
Phosphate E (Ground Belgian Phos.)	11¾	12	17½ (= 5¾ cwt. hay).*	15¾	64¾	64	,,		185¾	23¼

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* The produce of these plots was weighed as green grass immediately after cutting in 1915. It was then allowed to dry, and weighed as hay (in first class condition). This would have been done in all cases, but adverse weather conditions prevented it.

Experiment III.—*Cwt. of Green Grass per acre on the Triplicate Plots, each of* $\frac{1}{80}$*th acre.*

—	1914. Triplicate Plots			1915. Triplicate Plots			1916. Triplicate Plots.			1917. Triplicate Plots			Totals.	Average Weight of Green Grass per acre per annum for the Four Years.
	West	Middle.	East	West	Middle	East	West	Middle	East.	West.	Middle.	East		
													Cwt.	Cwt.
Slag A (low percentage of total phos., high sol.).	29½	32	19¼	74	67	64¼	99¼	98	90¾	Practically nil.			574	48
Slag B (low percentage of total phos., low sol.).	20	15¾	16½	25¾	22	22¾	50¾	46½	48	,,			268	22¼

Experiment IV.—*Cwt. of Green Grass per acre on the Duplicate Plots.*

—	1914. Duplicate Plots		1915 Duplicate Plots. First Crop.		1915. Duplicate Plots. Second Crop.		1916 Duplicate Plots		1917. Duplicate Plots.		Totals	Average Weight of Green Grass per acre per annum for the Four Years.
	West	East.	West.	East	West	East	West	East.	West.	East		
											Cwt.	Cwt.
Slag E, Ground Belgian Phosphate	15¾	19¼	35¾	35¾	27	31½	84¼	66	Practically nil.		315¼	39½
Slag D (low percentage of total phos., fairly high sol.) ..	28½	30¾	65	64½	52¾	47	105	78	,,		471½	59
Slag C (high percentage of total phos., high sol.)	30	33½	100	75	73	68½	122	102	,,		604	75½

Experiments I. and II., being precisely similar in type, may very well be considered together. It will be seen that in both experiments, the results are remarkably uniform, the no-manure plot having produced the smallest crop and being followed in order of yield by ground Belgian phosphate, slag B (low total phosphate, low solubility), slag D (low total phosphate, fairly high solubility), slag C (high total phosphate, high solubility), and slag A (low total phosphate, high solubility)

In Experiment III. the plots were immediately adjacent to those of Experiment II., on pasture sown down in 1901. They were in triplicate, $\frac{1}{80}$th of an acre in extent. Ten cwt. per acre of slags A and B were applied. Both slags contained 20·83 total phosphates, but slag A was of high, and slag B of low solubility. Each of the plots therefore received the same quantity of total phosphates.

There was no special " No Manure " plot for this experiment, but a narrow strip of land receiving no manure ran the whole length of the plots. The figures show a very remarkable superiority on the part of the highly-soluble slag. The plots manured with slag B showed a considerable effect upon the growth of white clover and other leguminous plants, as a result of the application The herbage, however, never attained any great height or bulk, and hence was largely missed by the scythe. In this connection it is worthy of note that had all the plots been grazed and the results estimated by inspection only, the conclusion might easily have been drawn that plots B were almost as good as plots A.

In Experiment IV.. 10 cwt. per acre of slags C and D and of phosphate E were applied to old pasture. The plots were $\frac{1}{80}$th of an acre each and immediately adjoined the plots of Experiment I. This experiment has no very direct bearing upon the question of solubility in slag as the amounts of phosphate applied differ, but it shows the remarkable increase in crop yield which follows the application of a heavy dressing of a high-grade, highly-soluble slag. It also indicates that the results likely to be obtained from slag are roughly proportional to the percentage of phosphates present and their degree of solubility. The difference in appearance of the plots has been very striking—they have stood out during the growing season almost like the squares on a chessboard. There was no special " No Manure " plot, but that of Experiment I. was adjacent

Summary of Results.—After examining the results of these experiments in detail the writer finds it impossible to escape the conclusion that under conditions similar to those prevailing at Saxmundham the citric solubility of the phosphate *present in a slag is a factor of great importance in* determining the agricultural value of that slag.

NOTE.—The writer wishes to acknowledge the kind assistance of Mr. J. E. Smith in sowing the manures and checking the figures, and of Mr. C. Cattermole in weighing the grass.

PIG FEEDING IN WAR TIME.

PART II.

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Piglings on Grass with Dry Cake.—The writers must, at the outset, warn all breeders who are trying this system for the first time, that this war-rationing robs pig-rearing of all romance, for piglings kept on grass and dry cake in such a summer as the one we have just passed through are in no sense a joy to gaze upon. It should also be pointed out that this system of pig production is a slow one. Rates of growth to be obtained when ample supplies of high-class and very palatable foods are available must not be expected. In preparing ration schemes for pigs or man in war time we have to consider what can best be done rather than of what it is best to do.

The drought-resisting capabilities of the grass land on the Cambridge University Farm, where these trials were carried out, is probably as bad as is likely to be discovered on any stiff soil. All the land used for grazing the piglings is on Boulder Clay. Some parts are only just passably drained and others so closely over-lie the Gault as largely to partake of its nature. With the exception of a few rainy days or an occasional shower, drought prevailed from early May to the end of July. For weeks at a time no rain worth mentioning fell at all. The result was that white clover and young, succulent "grasses," on which one might expect the little pigs to thrive, were absent.

By the middle of June the herbage consisted very largely of top-grasses that had become somewhat bent-like. The small stores were noticed to be grazing these in a very peculiar way Mouthfuls were bitten off, masticated, and then rejected, suggesting that much of the grass had become too woody and stringy for digestion. At the same time it was noticed that some young pigs which received the most restricted war rations were such rangers that it was almost impossible to confine them to one field. They seemed to be ranging in search of the *flowering heads* of the top-grasses, which they devoured greedily. Later, when the rain came towards harvest time, there was no great disposition to range, and all the young pigs buried their snouts among the soft young grasses which should have made their appearance eight weeks earlier.

Added to the want of young early grass and the consequent failure of succulent feed, the hot sun and the drying winds had the most disastrous effect on the skin of the young animals.* Altogether, from the appearance of the stock nothing could have been less successful than this experience of war-rationing. Nevertheless, it will be seen from the results that the system was not devoid of financial success even in so unpropitious a season; indeed, it is probable that, even in peace time, such a system would be quite useful in a year of normal rainfall.

Strict War Rations.—The piglings, according to the date of weaning, were divided into two lots; the group that were weaned first being called Lot A, those weaned a month later Lot B.

Lot A was composed of the two litters from the sows I. and II. referred to in the first part of this article.† With them were put three more piglings from the litter of an older sow (Ramsey Marie, No. 29590). Two of these were particularly promising young gilts. All piglings were grazing freely with their mothers before they were weaned. Those in Lot A were treated as follows:—

For eight days following 9th May, when they were weaned, they received a morning and evening meal of "slop" to make which ¼ lb. of pollard per head was used, so that each pigling got ½ lb. per day. In addition they received 1½ oz. of broken cake (half coconut, half palm kernel) mixed with 1 lb. of cut mangolds as a mid-day feed. On the ninth day after weaning the evening feed of slop was discontinued, being replaced by a feed of dry palm kernel, 4 oz. a head being allowed. These three meals were continued for another week, or until 27th

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* As they were of the Large-White breed, the piglings no doubt suffered more in appearance than coloured stock would have done.

† See this *Journal*, October, 1917, p. 721.

May, after which the morning meal of "slop" was replaced by the cut-root and cake mixture. Thus from 27th May, when the pigs were *11 weeks old* till the end of August—94 days in all—no slop of any sort was given as food.*

On 5th June, weaning being over, the piglings were again weighed. The average gain in 27 days was 6·14 lb. per pig (see Table III.). This was not good, but on the other hand cannot be considered bad; for the month after weaning is very trying under all ordinary conditions of pig-keeping.

The pigs were then put on to a diet of nothing but dry cake and grass; subsequently a few roots were given; they ate readily ½ lb. per head per day of palm kernel cake. This was raised to ¾ lb. after 30 days, but the increase was only continued for 10 days, as it was found that some of the cake was left. On returning to the allowance of ½ lb. of cake per head per day all was cleared up. At first the cake was fed in two feeds per day, then after 8 days the two feeds were reduced to one, in order to *economise labour* as well as to put the pigs on to war rations. The supply of drinking water was always ample.†

The poor average gains shown by the weighings on 3rd and 31st July (see columns 6 and 8 of Table III) only partially show the bad effect of the weather conditions. The piglings were evidently losing muscle, were very dry and scaly in the skin, and were affected with a mild vertigo which was attributed to the hot sun, though they always had access to shade. One of two things had to be done; either slop food had to be given or some fodder-crop had to be fed to supplement the supply of half-withered grass, which by 10th July was all the pasture could yield. Luckily we had some "Early-six-weeks" turnips, taken as a catch crop, and some "Marrow-stem" kale on which to rely. The former were fed at the rate of 2 lb. per head per diem from 23rd July, and 1 lb. of the kale was added on 1st August. This addition to their food led to the improvement shown by the weighing on 28th August (see column 10, Table III.).

The experience with this group of pigs leads the writers to warn those having soil like that of the University Farm in a district liable to drought to provide some suitable fodder crop by early July or, as an alternative, to be prepared to feed slop in addition to the dry cake if the grass fails.

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* Twice it was found necessary to feed slop for medicinal purposes, when a dose of salts had to be given.

† Six of these piglings were, for five weeks, moved to a different pasture from the others. A close study of the individual weighings on 3rd July and 31st July shows that the change made no difference, and so it is ignored.

Financial.—The statement given in Table IV. of all food fed and of live pig produced shows that the increase, though small, in the 111 days after weaning (9th May to 28th August) cost under 6*d*. per lb. of pig produced, which at prices of that date made them quite profitable stock. The appearance of the pigs, though now very much improved, was such as to make it desirable to test this result. On 30th August, therefore, the pigs were examined by a very well-known authority (Mr. H. Bell, of Messrs. A. T. Grain & Sons of Cambridge), who valued the 14 at an average price of 56*s*. 6*d*. per head. It will be noticed that the costs given in Table IV., are for food only; other expenses such as cost of weaned pigs,* labour, risk, etc., have to be added, but, all these notwithstanding, the figures seem to us to show a profit.

TABLE III.—*Average Weight of Pigs in Lot A.* (*Weight in lb.*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Dam.	No. of Pigs.	May 9 Weaning.	June 5, 27 days.		July 3, 28 days.		July 31, 28 days.		August 28, 28 days.		Total Gain, 111 days.
		Weight.	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	
Sow I. .	4	32·75	40·25	7·5	50·5	10·25	54·75	4·25	72·0	17·25	39·0
Sow II. .	7	29·28	35·57	6·28	42·71	7·14	46·57	3·86	58·5	11·93	29·14
R. M. ..	3	34·67	38·67	4·0	49·0	10·33	54·0	5·0	68·33	14·33	33·33
Average of	14	31·43	37·57	6·14	46·28	8·61	50·5	4·22	64·43	13·93	32·93

TABLE IV—*Cost of and Return from Lot A for Food.*
(Includes food given before weaning).

Expenditure.	*s*	*d*	*Receipts.*	*lb.*
Pollards, 15 lb. at 14*s*. 4*d*. per cwt	1	11	Average weight of pig 28th August ..	64·43
Palm kernel cake, 51·5 lb. at 15*s*. 6*d*. per cwt. ..	8	0	Average weight when weaned, 9th May ..	31·43
Coconut cake, 1½ lb. at 17*s*. 9*d*. per cwt ..	0	2	Difference (in 111 days)	33·00
Turnips (catch crop), 71 lb. at 9*d*. per cwt.	0	6		
Kale, 52½ lb. at 9*d*. per cwt.	0	4		*s*. *d*.
Mangolds, 25 lb. at 1*s*. 3*d*. per cwt.	0	3½	33 lb. of pig at 5·53*d*. =	15 2½
Grazing, 16 weeks at 3*d*. per week	4	0		
	15	2½		15 2½

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[*] From the actual cost of the four young sows, whose treatment was described in Part I. of this article, it is estimated that a fully grown sow may be fed at a cost of under £18 per annum on the system described (see p. 721 of this *Journal* for October, 1917).

TABLE V.—*Average Weight of Pigs in Lot B.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dam.	No of Pigs.	June 5, Weaning.	July 3, 28 days.		July 31, 28 days.		August 28, 28 days.		Total Gain, 84 days.
		Weight.	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	
Sow III...	5	33·40	42·8	9·4	50·0	7·2	68·8	18·8	35·4
Sow IV...	7	27·28	36·14	8·86	44·0	7·86	60·71	16·71	33·42
Average of	12	29·83	38·92	9·09	46·5	7·58	64·08	17·58	34·24

TABLE VI.—*Cost of and Return from Lot B for Food.*

(Includes food given before weaning).

Expenditure	s	d.	*Receipts*	lb	s	d
Pollards, 28 lb. at 14s. 4d. per cwt	3	7	Average weight of pig on 28th August ..	64·08		
Palm kernel cake, 31·5 lb at 15s. 6d. per cwt. ..	4	4¼	Average weight when weaned, 5th June ..	29·83		
Coconut cake, 14 lb at 17s. 9d per cwt. ..	2	3	Difference (in 84 days)	34·25		
Mangolds, 32 lb. at 1s. 3d. per cwt	0	4				
Turnips (catch crop), 70 lb. at 9d per cwt.	0	6				
Grazing, 13 weeks at 3d per week	3	3	34·25 lb. of pig at 5d per lb =		14	3¼
	14	3¼			14	3¼

Semi-War Rations.—The group of little pigs composing Lot B were also from the litters referred to in Part I. of this article out of the young sows Nos. III. and IV. They were weaned on 5th June, when from 56 to 59 days old. A study of column 2 of Table V. will show that these piglings were not quite so good as those in Lot A. (See column 2 of Table III.) so that care must be exercised when the two groups are compared.

In weaning Lot B the concentrated feeding stuffs were used rather more generously, and as the results seem better (cf. column 4, Table V. with column 4 of Table III.) it is suggested that the following rations may be regarded as a basis upon which to form a standard for this system at weaning time :—

	1st Week after Weaning (per head).	*2nd Week after Weaning (per head).*
Morning	—¼ lb Sharps (as slop).	¼ lb. Palm kernel cake (dry).
Mid-day Mixture.	1 lb. cut roots 2 oz Palm kernel cake. 2 oz. Coconut cake.	Same as first week.
Evening.	—¼ lb Sharps (as slop).	Same as first week.

The feeding of the 2nd week was continued till 7th July. All this time the grass was failing, and it ought, perhaps, to be stated that for *both lots* some help was obtained by throwing the pigs the "*thinnings*" from one acre of early turnips. As, however, this plant was only a catch-crop and all the five large sows had their share, it has not been brought into account. The matter is noted to show that nothing of this sort should be wasted; even a farm garden may help in such trying circumstances.

By the date last mentioned the grazing had got so bad that it was felt that it would be foolish to rely upon it altogether, even with the help of cake, so that, though the month following the actual separation of the pigs from their mother was then over, some slop was still given. *This feeding constitutes the radical difference in the treatment of Lot B and of Lot A.**

The rations fed to Lot B till 28th August, were as follows: From 7th July to 22nd July: In the morning ½ lb. palm kernel cake, at mid-day ½ lb. palm kernel and coconut cakes mixed (all cakes being fed dry), in the evening ½ lb. sharps (as slop). All these allowances were per head. On 23rd July, 1 lb. per head of cut "six-weeks" turnips was mixed with the mid-day cake, and on 1st August, the allowance of cake and cut turnip was doubled. This feeding was continued till 28th August.

In Table VI. are shown the cost and return from this lot of pigs. Contrasting the figures given in Tables IV. and VI it will be seen that the cost of growing 1 lb. of pig was rather less, notwithstanding the extra feeding, than in the case of Lot A. Mr. H. Bell valued this lot at 55*s.* per head. Probably the slight extra value (1*s.* 6*d.* per head) put on Lot A was due to their being better pigs to start with, *and it must be remembered that the pigs in Lot A were one month older than those in Lot B.*

After Effects.—It was much desired to compare the two lots of pigs once they were pushed on rather faster. The conditions favoured this. There was available a wheat stubble unfortunately only too full of shelled grain and spoiled heads, and on the stubble was growing, in weather which was now excellent, a thriving crop of red clover "seeds." On this the pigs were herded for about three hours every week-day from 29th August to 25th September, and it was delightful to see them asleep, fully stretched, directly their time "in clover" came to an end. The grass on their pasture was now abundant and the white clover also was plentiful. To all of this Class of feeding the following rations were added :—

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* On 21st June the skin of all the animals, sows and piglings, was very irritable indeed. The sows were therefore given 4 drams, and the piglings 1 dram of sulphur in some slop. This seemed to relieve the itching very much, though the appearance of sun-burn remained.

Rations.

Lot A. *Average per head per diem*		*Lot B.* *Average per head per diem.*	
¾ lb Sharps.	As slop.	⅜ lb. Sharps	As slop
¾ ,, Barley (tail) meal		⅜ ,, Barley (tail) meal	
2 ,, Marrow stemmed kale.		2 ,, Marrow stemmed kale.	
½ , Palm kernel cake (dry).		¾ ,, Palm kernel cake (dry).	

After another interval of 28 days both lots were weighed on 25th September, with the following results :—

LOT A.

Sow I.	.. 4 pigs averaged 92·5 lb.	Average gain	21·5 lb.
Sow II.	.. *6 ,, ,, 78·3 ,,	,, ,,	20·16 ,,
R.M.	.. 3 ,, ,, 93·3 ,,	,, ,,	25·00 ,,
	Average of 13 pigs 86·1 lb.	Average gain	21·69 ,,

LOT B.

Sow III.	.. 5 pigs averaged 86·00 lb.	Average gain	17·2 lb.
Sow IV.	.. 7 ,, ,, 78·14 ,,	,, ,,	17·4 ,,
	Average of 12 pigs 81·4 lb.	Average gain	17·3 ,,

It is not possible to get out a balance sheet for this month as the value of corn on the stubble and the clover in the "seeds" cannot be ascertained. The pigs were carefully watched to see that they did not injure the "seeds"; the writers are of opinion that the grazing did good by preventing the plant from getting too forward.

The important item to notice in this months' work is that the average gain (of 25 pigs) is just over 19·5 lb. per head, and that only 28 lb. of concentrated or imported food was consumed to obtain the increase—a result that is eminently satisfactory from the point of view of decreasing imported foodstuffs in regard to pork production at the present time.

On 3rd October, *after an interval of* 5 *weeks*, Mr. H. Bell again valued the pigs, and put them at 80s. per head—a figure which may be taken to show that by this date the pigs were thoroughly good "stores." This valuation, too, was some consolation to the writers for the many scornful things that the majority of the three hundred farmers who visited the University Farm had said during the summer about the personal appearance of the young pigs.

The experiment further leads to some reflection regarding the past. From 3 to 4 lb. of *corn* has, in the past, very frequently and constantly been used to grow 1 lb. of young pig; for older animals even up to 7 lb. One may well wonder if the era of very cheap corn and, one is bound to add, the fashion set by some exhibitors at our shows,* has not led to some extravagance in the forcing methods of feeding corn even in peace time, in our national swine husbandry. At any rate, experience shows that for young pigs in war time, very large proportions of concentrated feeding stuffs are unnecessary. If the figures for the first period are examined it will be seen that 26 pigs have been grown, for 98 days after weaning, at a cost of just under 2 lb. of concentrated food for every pound of pig produced (this, of course, in addition to the bulky farm produce already mentioned). The standard for corn, no other food being given, is recognised to be about 3·75 lb. for each pound of young pig produced.

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* One of the pigs unfortunately met with an accident and died of peritonitis, reported by our veterinary surgeon, after *post mortem*, to be due to "an external injury"

It is not in the least desired to suggest that this method is the best possible; in fact it would seem that the pigs in Lot A were under-fed with concentrated food, even for war time. The records are published as an example of the possibilities of a system that is believed to be valuable at the present time. It is further pointed out that with this sort of feeding great care and trouble are required to ensure that the young pigs do not stop growing and begin to go back.

Conclusions.—It is considered that the trials show:—

1. That sows do well, while suckling, when fed on cut roots and cake if the few precautions mentioned in Part I of this article are observed.
2. That piglings, with a little help, even in such a trying season, may be economically run on as "stores" on grass land.
3. That on grass land a small quantity of dry cake is a very valuable concentrated feeding stuff for young pigs.
4. That, as a precaution against drought, a small area of suitable fodder crop will prove very valuable.
5. If no fodder crop is available, in time of drought, a small allowance of "sharps" slop will replace it.
6. That, though this system of pig keeping is not extravagant in labour, it requires considerable care and skill, such as might well be undertaken by any well-trained and strong woman war worker.

The writers thank Mr. A. I. Anderson for constant assistance during these trials, which involved a great number of weighings (each day's rations for all lots, young and old, went over the scale) of food and of pigs.

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* At a show in 1912 two little "Porker" pigs weighed 186 lb. at 2 months and 4 weeks old; many such examples might be quoted.

THE MARKET-GARDEN DISTRICT OF BIGGLESWADE, BEDFORDSHIRE.

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IN recent years attention has been drawn to the importance of the relationship which exists between the chemical and physical properties of soils and their suitability for particular kinds of crops. It is with a view to the study of this relationship that crop and soil surveys are made. Samples of the soils found in a given district are submitted to analysis, and detailed field notes are simultaneously taken for the whole area in question. From the data obtained in a series of such surveys it has been possible to explain the causes of fertility and infertility within certain districts, and to give sound advice on cropping, the use of proper artificial manures, the value of liming, and other points of importance.

An account of the soil formations and crops of the market-garden district of Biggleswade has already been published.* Further observations made in the course of the survey are given below.

Part I.—THE MORE IMPORTANT MARKET-GARDEN CROPS IN THE DISTRICT OF BIGGLESWADE.

Potatoes.—At the beginning of the 19th century, the district round Biggleswade was particularly noted for its onions, but with the development of market gardens in the sandy tract north of Biggleswade the potato gradually came into prominence, until to-day it is the most important product of the whole district which stretches from St. Neots in the north to Henlow in the south, and from Gamlingay in the east to Willington in the west. The light, greensand soils round Potton, Gamlingay and Sandy are well known for their early potatoes, which are ready a week or so before those from other parts of the district. The Greensand and dark valley gravels near Langford, Biggleswade, Sandy, and Eynesbury grow second earlies, and the lighter loamy soils of the brown valley gravel near Stanford Broome, Wyboston and Eaton Socon, the Brick Earths and the heavy loams overlying the Boulder and Oxford Clays, are devoted to main crops. (For the composition of typical potato soils see the table on p. 839.)

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* *The Journal of Agricultural Science*, Vol. VII., p. 385, 1917.

Early potatoes may be grown either as a full crop or as a half crop; in the latter case they are interplanted with Brussels sprouts or runner beans. On the earliest soils a full crop is usually grown and followed by turnips, but where the land cannot be cleared in good time interplanting is more generally the rule. All early potatoes are sprouted before planting, and the land is heavily manured during the previous winter with 20 or 30 tons per acre of London dung. Planting is begun early in March and is done either on the ridge or on the flat; splitting the ridges back over the potatoes is usual with the larger growers. In good seasons the earliest potatoes are ready for digging by the second week in June, but on the majority of the soils the crop is not ready till a week or a fortnight later, and as it is during those first ten days that the really high prices are made, the growers of the Potton, Gamlingay and Sandy districts possess a very distinct advantage over growers in other parts Early Puritan is a universal favourite as a first early, and Epicure is also popular though not ready so soon. These are followed by Duke of York and Sharpe's Eclipse and later by British Queen.

The yield depends on the season and the rainfall. The soils particularly adapted to early potatoes are so coarse in texture that very little water can be raised from the subsoil by capillarity, and the crop is therefore dependent on the rainfall throughout its period of growth Consequently a drought in early June results in a very small crop. A full-crop yield of 6 tons to the acre, or of 3 to 3½ tons where interplanted, would always be considered very good, though the half crop would be a little heavier on the loams, where it is also a little later.

Main crops are hardly ever interplanted and do not usually require such heavy dressings of manure Some of the large growers find it profitable to plough under a clover ley as a preparation; one man, who usually obtains yields of 14 to 16 tons per acre compared with the average 8 tons for the whole district, ploughs his clover sod to a depth of 10 to 12 in., and then, after an application of a small dressing of dung, cross ploughs to a depth of 5 in., occasionally adding a little artificial manure. King Edward VII. is preferred to all other late varieties on account of its resistance to disease. Up to-Dates are better yielders but more susceptible to disease, and as very little spraying is done in the district this variety frequently gives disappointing results. Dalhousie, Mayfield Blossom and Factor are also grown.

Throughout the district there is considerable prejudice against the use of artificial manures for the potato crop ; even a supplementary dressing is considered unprofitable, and the small growers are unanimous in their condemnation. This is especially the case on the lightest soils where the earliest crops are obtained, and where the growers rely absolutely on dung and soot. It is the more remarkable as the results of experiments would show that if the soil is first provided with a bulky organic manure, a small dressing of artificials gives good returns. For instance, the results of three trials are set out below .—

	Manuring		*Yields.*	
Locality.	*Dung* *Tons*	*Artificials* *Cwt*	*Tons*	*cwt*
Potton (Earlies).	10	½ Am sulphate ½ Pot ,, ½ Superphosphate	4	5
	20	——	4	
Sutton (Second earlies)	15	⅝ Am sulphate ⅝ Pot ,, 3⅛ Superphosphate	7	
	15	——	5	10
Stanford Broome	—	2 Am sulphate 1 Pot ,, 2 Superphosphate	6	0
		100 bush of soot	3	10

In the first case the artificials were substituted for half the dressing of dung without reducing the crop ; in the second case an additional dressing of artificials increased the yield by 1½ tons, and in the third experiment the trial plots were situated in a locality where dung is not easy to obtain and where large quantities of soot are consequently used by growers. The artificials proved themselves vastly superior to the soot.

Onions.—From being the most important crop in the district, onions have taken a very secondary position and have been replaced, to a large extent, on the English markets by Egyptian, Spanish and Dutch produce. They are now found only on soils well adapted to their needs, such as medium and heavy loams, especially the dark gravel loam of Biggleswade, examples of which are given in the table. The crop requires a soil in high condition, and is usually taken after potatoes which have been liberally manured with dung. The land is ploughed to a depth of 10 in., exposed to winter frosts, then dressed with soot or malt dust in spring and again ploughed. A fine, deep seed-bed is absolutely necessary, and after the seed has been drilled or broadcasted the surface is well rolled.

Onions are frequently grown in association with parsley, and in that case the parsley is not drilled until two or three weeks later than the onions. In August, when the onions are pulled, the parsley is left in sole occupation of the ground till the following spring. The weeding of the onion crop is often let out to gangs of experienced weeders who are paid at the rate of about £5 per acre to undertake the care of the crop till it is ready for pulling. The harvesting of the crop should begin in August, the pickling onions being pulled first and then the main crop. The onions are laid out on the ground in rows until the tops have withered, and then they are collected and stored in a loft and sold as the demand arises. Dry weather is essential for lifting, otherwise considerable losses occur during storage.

The onion crop is very usually sold standing, either at a fixed rate per acre, *e.g.*, £25, when the buyer pays for the raising of the crop, or at so much per ton for the raised crop. Gross returns of over £70 per acre have been made on the latter system. Yields vary from 6 to 14 tons per acre, and prices fluctuate considerably with the season. In 1912–1913, when the crop was abundant, prices ranged from 3*s.* to 6*s.* 6*d.* per cwt.; in 1913–1914 the price ran up to 17*s.* 9*d.* per cwt.

Three varieties of onions are commonly grown in the district, Up-to-Date, White Spanish and Bedfordshire Champion.

Brussels Sprouts.—Wherever the smallholder is established Brussels sprouts form a very popular crop, for they provide him with a constant source of revenue from the middle of September till the middle of March. Although they are found on almost every type of soil, many soils are distinctly unsuited to the crop. Such for instance are the Greensand soils of Potton, Everton and Sandy, and the brown, gravel soils of Stanford and Wyboston, which have such a marked deficiency in calcium carbonate that Brussels sprouts almost invariably suffer from club-root if they are grown there regularly. Even if the crop remains free from disease on these soils the quality of the produce is always low; the sprouts are loose and lack firmness, and the plants have a great tendency to "break away" to seed in spring. Typical Brussels sprouts soils—heavy loams—are given in the Table. Crops on the dark, gravel loam are large and mature early, but they do not last as long as on the heavier soils.

Brussels sprouts are always raised in a seed bed and planted out, and quite a trade in the young plants has arisen near Biggleswade Common. The seed is drilled in late February and planting out takes place from May till July. Plants are always put in 3 ft. apart each way. They may follow a full crop of early potatoes or early peas, or may even occupy the ground alone for a whole season—in which case the crop is of course larger but has to pay more for rent. They are sometimes planted between the rows of early potatoes, as mentioned above. Probably the total profits are greatest when the sprouts are planted between the potatoes, for they then get a good start before the dry weather sets in, and the failures which frequently occur through planting in July are avoided. On the other hand the removal of the potato crop is said to be detrimental to the Brussels sprouts, because the land is then opened up to the drying effects of sun and wind, and on this account some growers will never interplant them. Serious damage from this cause, however, need only be feared on the lightest land.

Where Brussels sprouts are interplanted they are grown on the residues left by the potato crop; if they follow a catch crop the land receives a dressing of dung before being ploughed; if they are grown alone a good dressing of dung is always used. Very occasionally soot is substituted for dung. As soon as the plants have got a good start they are dressed with a mixture of equal parts of nitrate of soda and common salt at the rate of 2 cwt. to the acre, the mixture being thrown round the roots of each plant and being highly esteemed for bringing them on. As Dyer and Shrivell* have clearly shown that Brussels sprouts always give better results with artificial manures than with dung alone, the market-gardeners of Bedfordshire would be well advised to use more artificials for their sprouts and to keep the dung for crops which cannot dispense with it so well.

In the early part of the season, when the best prices are being made (20*s*. to 28*s*. per cwt. normally), the sprouts are packed in wicker baskets for the market, but as the season advances care is relaxed and they are put into small sacks. The plants are usually gone over three or four times during the season, and an average yield for the district would be 2½ tons per acre. The varieties commonly grown are Eiffel Tower, Covent Garden, Exhibition and Sharpe's Standard.

Seed Growing.—A considerable acreage of land in the district is devoted to the production of seed. Clover and mangold seed are grown more particularly on the heavier soils under farming conditions, while onion, carrot, parsley, turnip, kohl rabi and Brussels sprouts seeds are produced by the market-gardeners.

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* *Manuring of Market-garden Crops.*

The growth of onion seed is a great gamble. In a favourable season high profits are made, but a spell of bad weather at harvest time or an outbreak of disease will result in serious loss. Selected bulbs are planted out in spring in rows about 2 ft. apart, 2 tons of onions being required to plant 1 acre. When the seed heads are forming, strings are run up the rows to give support to the stems which appear top-heavy. The ripe seed heads are cut by hand and placed on canvas sheets or in a loft, and are covered with straw to heat them and crack the husks. Cleaned onion seed is normally worth 4*s.* to 5*s.* per lb. and, as an average crop yields 5 cwt. per acre, a successful crop is also a very paying one, but it is extremely uncertain.

Parsley is always grown as an intercrop with onions or carrots, and the production of seed depends largely on the market price of green produce during the spring months. If prices are good then the whole crop is sent to market, but if the prices fall then growers will frequently leave it for seed. The heads are cut in small quantities when ripe, dried and threshed on canvas sheets.

Carrot seed is not grown in large quantities. Seedlings are planted out in the winter in rows 2 ft. apart, otherwise the crop is treated in the same way as parsley.

Composition of Typical Soils associated with various Crops.

	EARLY POTATOES.		LATE POTATOES.			ONIONS.		BRUSSELS SPROUTS.	
	Green-sand.	Dark Gravel.	Glacial Gravel.	Brick Earth.	Typical Potato Soil (Hall & Russell)*	Dark Gravel.	Glacial Gravel.	Brick Earth.	Wash on Boulder Clay.
	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
Stones ..	7·4	9·8	5·7	2·4	—	9·8	5·7	2·4	7·9
Fine gravel	6·8	2·8	2·9	1·7	0·9	2·8	2·9	1·7	1·8
Coarse sand	55·5	35·5	25·5	28·3	20·6	35·5	25·5	28·3	27·5
Fine sand	13·3	19·5	20·1	18·0	45·2	19·5	20·1	18·0	18·5
Coarse silt	8·3	12·9	10·5	13·7	10·8	12·9	10·5	13·7	10·4
Fine silt ..	3·6	7·0	9·0	10·3	6·0	7·0	9·0	10·3	7·9
Clay ..	4·5	10·3	17·4	15·1	9·0	10·3	17·4	15·1	17·9
Moisture ..	1 3	2·0	3·2	2·0	—	2·0	3·2	—	—
Organic matter	4·9	6·6	5·8	5·7	—	6·6	5·8	5·7	6·6
Calcium carbonate	0·08	0·58	2·7	0·80	—	0·58	2·7	0·80	3·1*
Potash ..	0·19	0·37	0·68	0·51	—	0·37	0·68	—	—
Phos. acid	0·21	0·26	0·34	0·14	—	0·26	0·34	—	—

* *Agriculture and Soils of Kent, Surrey, and Sussex, p.* 152, 1911.

STORAGE OF VEGETABLES FOR WINTER USE.

THE value of the produce of an allotment or cottage garden may be increased considerably by growing vegetables suitable for use in winter when they are likely to be scarce and dear. To secure this result three points must be kept in mind :—

First, varieties suitable for winter use must be chosen: *e.g.*, in the case of savoys, those of the Ormskirk type, which will stand long ; in the case of onions, those varieties (such as James' Keeping Onion) which are known for their good keeping qualities.

Second, late summer sowing of crops such as beet, carrot and turnip which will stand the winter on the ground should be practised.

Third, vegetables which cannot be left on the ground, or which for convenience are better stored, should be harvested in good time, and stored under the most favourable conditions.

It is often desirable to store even those vegetables which frost does not damage, especially if the garden is not quite near the house, if the land is required to be cleared for digging, or if hard frosts are likely to prevent the crops from being lifted during winter.

Of common vegetables some should be stored in a dry state ; others need to be stored under conditions which, while they check growth, at the same time prevent loss of moisture and consequent shrivelling.

VEGETABLES STORED DRY.

Beans.—The dry seeds of beans of all kinds may be used for winter food and are of high food-value.

Broad beans may generally be left to ripen where they were growing, and when the haulm turns black and dry the pods may be gathered, shelled and the seeds spread out to dry thoroughly before storing.

Dwarf beans and haricot beans for winter use are ready to harvest when the pods and leaves turn yellow. They are best pulled up bodily and hung in an airy place until the seeds are ripe, then shelled, and the seeds spread out to dry.

Scarlet runners may be treated in the same way, or the pods which have turned yellow may be picked off in October, spread out to dry, and when dry shelled and the seeds further dried.

When thoroughly dry the seed may be kept in bags or boxes in a cool, dry place.

Peas.—Peas may be treated in the same way as dwarf beans, or the pods may be gathered just before they are fully grown, and the shelled peas spread thinly on paper on a baking sheet and dried thoroughly in front of the fire or in the oven with the door open. After they have been dried the peas must be kept in a very dry place or in stoppered bottles.

Among the best varieties for preserving in a dry state are Little Marvel, Fillbasket, Duke of Albany, and Pride of the Market.

All dried seeds require *prolonged soaking* before being cooked; for example, peas should be soaked in water for 24 hours, and it is well to add a pinch of bicarbonate of soda to the water in which they are soaked.

Onions.—Autumn-sown onions are ready for lifting at the end of July or the first half of August. Spring-sown onions are ready in August or early September. As soon as the leaves begin to turn brown the tops should be bent over to hasten ripening. The plants are pulled up a few days afterwards, laid, if possible, on a hard surface in the sun to dry, and turned occasionally. This will take from a few days to a fortnight or so, according to the weather. When dry the loose, outer skin and the long, coarse roots should be removed, and the bulbs stored in a cool, dry, airy place. A few degrees of frost will not harm them. The sound, dry bulbs may be tied in "ropes" and hung in a cool, well-ventilated shed, or laid two or three deep on battened shelves in a room like a fruit room, but more airy, or on the floor of a dry shed.

Shallots.—Shallots are ready for lifting as soon as the leaves begin to die down in July. They are dried in the same way as onions, cleaned of all old leaves and loose scales and stored in a cool, dry and airy place in shallow boxes. So stored they will keep until April.

Vegetable Marrows and Pumpkins will keep for several months if cut just before they are ripe and hung in a cool, dry place, but they must not be subject to many degrees of frost.

Herbs.—Herbs used for flavouring, such as mint, parsley, sage, marjoram, thyme, may be gathered in summer when at their best, dried on a paper in front of a fire, the leaves rubbed off their wiry stalks, kept in dry stoppered bottles or in tins with lightly-fitting lids, and stored in a dry place.

VEGETABLES STORED IN CLAMPS, ETC.

In no case should diseased or damaged vegetables be placed in the store, for the decay begun in them is likely to spread through the neighbouring sound plants.

Beet.—Spring-sown beet should be lifted in October or November ; if left longer in wet or heavy soils they are apt to suffer, and even in lighter soils they may be attacked by slugs and grubs. When lifting, care should be taken not to break or damage the rootlets or to break the skin of the " bulb," for if broken bleeding will occur. For the same reason the leaves should be twisted and not cut off. The beets, after being allowed to dry for a day or two, may be stored outdoors in a small clamp made by placing the roots in layers, each layer being covered with fine soil or ashes. The " clamp " should be placed in the driest part of the garden or allotment. Fine soil or sifted ashes are spread in a circular patch on the ground and a layer of beets with their crowns outward placed thereon. The roots are covered with sifted ashes, sand, or fine soil to give protection from slugs. Another layer is added followed by a covering of ashes or soil, and so on. The mound should be built in a conical shape. When all the beets are stacked, cover with a layer three or four inches thick of straw or dry bracken and put an upright wisp of the same material at the top so that it projects beyond the final covering of three or four inches of soil. This wisp of straw will allow of ventilation, and if the clamp is a large one it should be supplemented by others at intervals on the sides. Dig a trench around the clamp so as to permit water to drain away.

If a cool cellar or shed is available the beets may be stored there in sand or fine soil.

Late (July) sown beet should be left in the ground through the winter and pulled as required.

Carrots.—Carrots should be treated exactly like beet. They are perfectly hardy, but early-sown carrots if left too long in the soil are apt to crack or their side roots may begin to grow, and if that happens the flavour is impaired. Late (July) sown carrots should be left in the ground and pulled as required.

Celery and Celeriac are generally left in the ground, but where the soil is very wet and cold they may be stored. Celeriac is treated exactly like beet and carrot. Celery should be lifted (with as much earth as possible) about the end of October or early November, packed closely together upright against a wall or bank, and the exposed side should be banked up with soil. Where the celery is left in the ground, dry litter, such as straw or bracken, should be placed in the spaces between the ridges in severe weather, and the tops of the plants may be covered with the litter as an additional protection, but this must be removed when the weather is fine.

Jerusalem Artichokes may be stored in exactly the same way as potatoes, but are best left in the ground and lifted as required. Litter may be scattered over the bed on the approach of severe weather so as to keep the soil sufficiently soft to dig. In February the remnant of the crop should be lifted and stored in moist earth in a cool place.

Parsnips may be lifted in November and stored like beet, but are best left in the ground and lifted as required. Here, again, litter may be used to keep the ground soft in hard weather.

Salsify and Scorzonera are treated like parsnips.

Swedes are best left in the ground until required, but may be stored like turnips.

Turnips are best left in the ground, but may be dug up on the approach of hard weather, their tops cut off and the roots buried in sand or ashes in a cool shed or cellar, or they may be clamped like beet and carrot.

Broccoli and Cauliflower may be kept for a few days when ready for use if pulled up and hung head downwards in a cool place out of the wind. For winter use they may be lifted at the end of October or early in November with a good ball of soil and planted close together in deep frames or open sheds. Where broccoli is to remain outdoors through winter it is a good plan in November or early December to take out a spadeful of earth on the north side of each plant, then thrust the spade into the ground on the south side and push the whole plant over so that it slants towards the north. The stem is then covered with soil up to the base of the leaves and the plants left.

Leeks, Kohl Rabi, Brussels Sprouts, Savoys, Kale, and Spinach Beet should be left in the ground until required.

Potatoes.—The storage of potatoes was dealt with in this *Journal* for September, 1917, p. 629, and is therefore not repeated here.

INSECT PESTS OF BASKET WILLOWS.

THE following notes on the Insect Pests of Basket Willows have been written by the Board's Entomologist, Mr. J. C. F. Fryer.

Few plants are more subject to the attacks of insects than willows or osiers, and in any season the crop may be so damaged as to be almost worthless. The fungus diseases, on the other hand, are not so numerous. It is only possible to deal here with a few of these pests, most of which will already be familiar to growers, though in many cases they have no well known English names. They may, as a rule, be recognised by the type of injury they cause, and it may, therefore, be convenient in the first place to describe certain characteristic attacks to enable the grower to recognise the pest by which his crop is damaged. The types of injury are divided into (I.) those which affect the leaves, the top or terminal bud or shoot of the rod; (II.) those which affect the rod itself; (III.) those which affect the stump.

The following table is intended to assist the grower in recognising the pests by which his beds are attacked :—

I.—Damage to Leaves and Terminal Buds.

(*a*) Leaves and shoots eaten by dark green or blue beetles (which fall but do not jump when disturbed) or by their larvæ, which are blackish or yellowish grubs, sometimes known as Army worms. See also *II.* (*a*) below. Common Willow Beetles (*Phyllodecta vitellinæ* and *Phyllodecta vulgatissima*).

(*b*) Similar damage, but light brown beetles present. Galerucella Beetle (*Galerucella lineola*).

(*c*) Leaves eaten by livid blue and orange caterpillars. Willow Sawfly (*Nematus salicis*).

(*d*) Leaves with yellow or red lumps on them. Willow Gall Sawflies (*Pontania salicis*), and others.

(*e*) Leaves and young shoots covered with black or green fly or " blight," or with sticky honey-dew, or with honey-dew and black mould. Willow aphides (various species).

(*f*) Terminal or end bud of shoot tied up with a few fine strands of silk and often containing a brown chrysalis or a small caterpillar which feeds on the young, growing leaves. See also *II.* (*a*) below. Small willow moths (various species).

(*g*) Terminal or end bud in the form of small rosette or button, often known as " button top." Gall midges (*Cecidomyia heterobia* and *C. rosaria*, etc.).

(*h*) Leaves covered, especially on the under side, with orange yellow spots. Spots brown later in the season. Willow Rust, caused by the fungus *Melampsora.*

II.—Damage to Rods.

(*a*) Rods with lateral or branch shoots near the top, usually shorter than normal rods, often known as "bushy topped." This injury is usually the result of the destruction of the terminal bud when the rod is growing. Willow beetles, willow moths, aphides, and, perhaps, gall midges.

(*b*) Rod covered with black fly or blight, the insects closely crowded together and often killing the rod. Willow aphides (especially *Melanoxantherium salicis*).

(*c*) Young rod in early summer broken as if by wind, but close examination shows a hole or puncture at the point where the break occurred. Willow Weevil (*Cryptorrhynchus lapathi*).

(*d*) Rods, especially of two years' growth, with minute pin holes through the bark near the base. Inside are small burrows often containing minute orange-red (or green ?) grubs. Willow Wood Midge (*Cecidomyia saliciperda*).

(*e*) Rods, mainly when of two or more years' growth, with a channel bored up the centre near the base, sometimes containing a white grub or a beetle. Willow Weevil or Willow Clearwing moths.

(*f*) Cankerous wounds on the rod. Developing mostly in winter. Wounds not preceded by elongated orange-yellow pustules. Willow Canker, caused by the fungus *Botryosphæria gregaria.*

(*g*) Cankerous wounds on the younger portion of the rods. Always preceded by elongated orange-yellow pustules which are found in summer. Rust Canker, due to wounds formed by the rust fungus *Melampsora.*

III.—Damage to Stumps.

Stumps with burrows and channels, often dying and containing white grubs, chrysalides, or beetles. Willow Weevil, Musk Beetle, Willow Clearwing Moths.

The following sections deal in greater detail with the insects and fungi themselves :—

Willow Aphides.—There are several species of aphides which attack willows, and, on the whole, they are, perhaps, the most serious pest with which the grower has to contend. By sucking the juices of the plants, they stunt and kill both leaves and rods. They also secrete large quantities of honey-dew which falls on the leaves, coating them over with a kind of varnish, and greatly accentuating the damage done by the insects themselves. Further, a black fungus or "mould" commonly grows on the honey-dew, coating the leaves still further, and making it impossible for them to carry out their functions. It should be emphasised that the honey-dew is always the product of the aphides, and is not a separate form of blight due to climatic conditions, an opinion which is commonly held but which is quite erroneous.

It is unnecessary here to enter into the features by which the various species are distinguished, and, in many cases, their habits require further investigation. It may, however, be mentioned that certain common species (*Siphocoryne capreæ* and *S. pastinaceæ*) live partly on the willow and partly on weeds such as hemlock, wild parsnip, chervil, angelica, etc. (*Umbelliferæ*), and special attention should, therefore, be paid to the eradication of such weeds.

Species of aphis common on the leaves and shoots are *Aphis saliceti*, the two species above mentioned, and *Pterocoma pilosa*. The most common species on the rod itself is *Melanoxantherium salicis*.

Willow Beetles (*Phyllodecta vitellinæ*, *Phyllodecta vulgatissima*).—In the adult state these insects are shining dark green or blue beetles. They first appear in spring and early summer and at once attack the developing shoots and leaves, causing great injury by eating into the growing point of the rod. Eggs are laid in groups on the underside of the leaves, and in a short time produce small, dirty grey or yellow coloured grubs or larvæ, which at first remain together eating away the under side of the leaf. Later, as they grow larger, they spread to other leaves, devouring each so that only the upper paper-like cuticle is left, and, in severe cases, all the leaves on the plants are killed. When full fed, the larvæ fall to the earth and change into pupæ from which beetles are produced. There are two broods of beetles in the season, but the generations overlap somewhat, so that beetles and larvæ are often found together. The beetles of the second brood leave the rods in autumn and crawl into heaps of rubbish, under the bark, and into the crevices in pollard willows, and shelter there during the winter, reappearing to attack the willows again the following spring.

Beetles of the genus *Phyllodecta* are common all over the country, and all willow-growing areas are subject to their attacks. They are, perhaps, especially harmful in the Midland and East Anglian districts.

Galerucella Beetle (*Galerucella lineola*).—This insect in the adult state is a yellow-brown beetle with dark markings on the upper surface. In its life-history and habits, with the exception of certain minor differences, it resembles the *Phyllodecta* beetles just described. It appears, however, to spend the winter in damper places, and is especially harmful in the Somerset district.

Willow Weevil (*Cryptorrhynchus lapathi*).—This beetle, on account of its long trunk or proboscis, is sometimes known as the elephant beetle. It is partly blackish-brown in colour and partly yellow (or pink when freshly emerged).

The adult beetle appears from early summer onwards, and may be found clinging to the rod with its trunk buried in the soft-growing portion, which subsequently bends over as if broken by the wind. At the smallest disturbance the beetle falls to the ground and remains motionless, looking very like a bird dropping. Eggs are laid in the stumps or rods (?) and produce white, grub-like larvæ which burrow in the stumps and sometimes up into rods of two years' growth. Cryptorrhynchus larvæ have no legs, this distinguishing them from the larvæ of the clearwing moths, and they are round and somewhat short, and so differ from the larvæ of the Musk Beetle, which are rather long and flat. When full fed they pupate in the burrows and the beetles emerge from the pupæ in the autumn, but seem to remain in the burrow until the following spring.

Cryptorrhynchus lapathi attacks alder as well as willow, and is common in all willow-growing areas, notably in Somerset. It is a serious pest, for, in addition to the annual destruction of a large number of rods by the adult, the larvæ does great injury to the stumps.

Musk Beetle (*Aromia moschata*).—This insect is a large, shining blue or green beetle with long antennæ. When disturbed it gives out a strong musky smell. The larva is a large white grub, legless, and rather long and flat in shape. It feeds in pollard willow trees and in old willow stumps, especially when these are grown with a "long leg." It can hardly be regarded as a serious pest when willows are well grown, but is worthy of mention as it is so large and conspicuous that it is apt to excite interest.

Willow Sawfly (*Nematus salicis*).—Reference is made to this insect as it causes much loss on the Continent and occasionally does so in this country. The larva is a livid blue and orange caterpillar which feeds on the willow leaves and may completely defoliate the rods. It can hardly be confused with any other pest. Recently, notes of serious damage have only been received from the Peterborough district, and information in the event of further attacks would be welcomed. There are also other species of sawfly besides *N. salicis* which may be expected at times to do damage.

Willow Gall Sawflies (*Pontania gallicola*) and other species.—Inquiry is often made as to the cause of the red and green globular or bean-shaped swellings which are so common on the leaves of willows. The insects responsible are certain species of gall sawfly, of which that mentioned above is most common. The sawfly larva lives in the gall, and, when full fed, burrows out and pupates in the soil. Unless the galls are so numerous as to weigh down the rods, the injury does not seem to be serious.

Willow Moths.—The larvæ of many different moths feed on willow, but with certain exceptions they are seldom present in sufficient numbers to do serious harm. The exceptions comprise (1) various species of small moth, the larvæ of which feed in spring and summer in the terminal shoot of the rod; (2) certain clearwing moths whose larvæ burrow in the stumps and in the rods.

(1) Further investigation is required before the life history of each species can be described in detail. The larvæ first become noticeable in late spring, when they spin together a few leaves at the tips of the growing rods, forming small tubes or nests, one larva only being found in each shoot. They feed on the growing buds and leaves, and, when full fed, change into brown chrysalides in the nests, from which in due course the moths emerge. The damage is serious, since it prevents the rod from attaining its full length and also, owing to the destruction of the growing point, encourages the production of lateral shoots, a condition known as "bushy top." So far as the Somerset district is concerned the most common species are *Hypermecia cruciana* and *Depressaria conterminella*.

(2) There are two species of willow clearwing moth of which the first, *Trochilium bembeciforme*, the Willow Hornet Clearwing so closely resembles a large wasp or hornet that it may readily be passed over. The second species, the Red Tipped Clearwing (*Sesia formicæformis*) also has little resemblance to a moth, and is, perhaps, more like an ichneumon fly. The larvæ of these moths are white, grub-like caterpillars with brown heads and eight pairs of legs, which are small but evident. The Hornet Clearwing larva lives inside the stumps and especially in rods

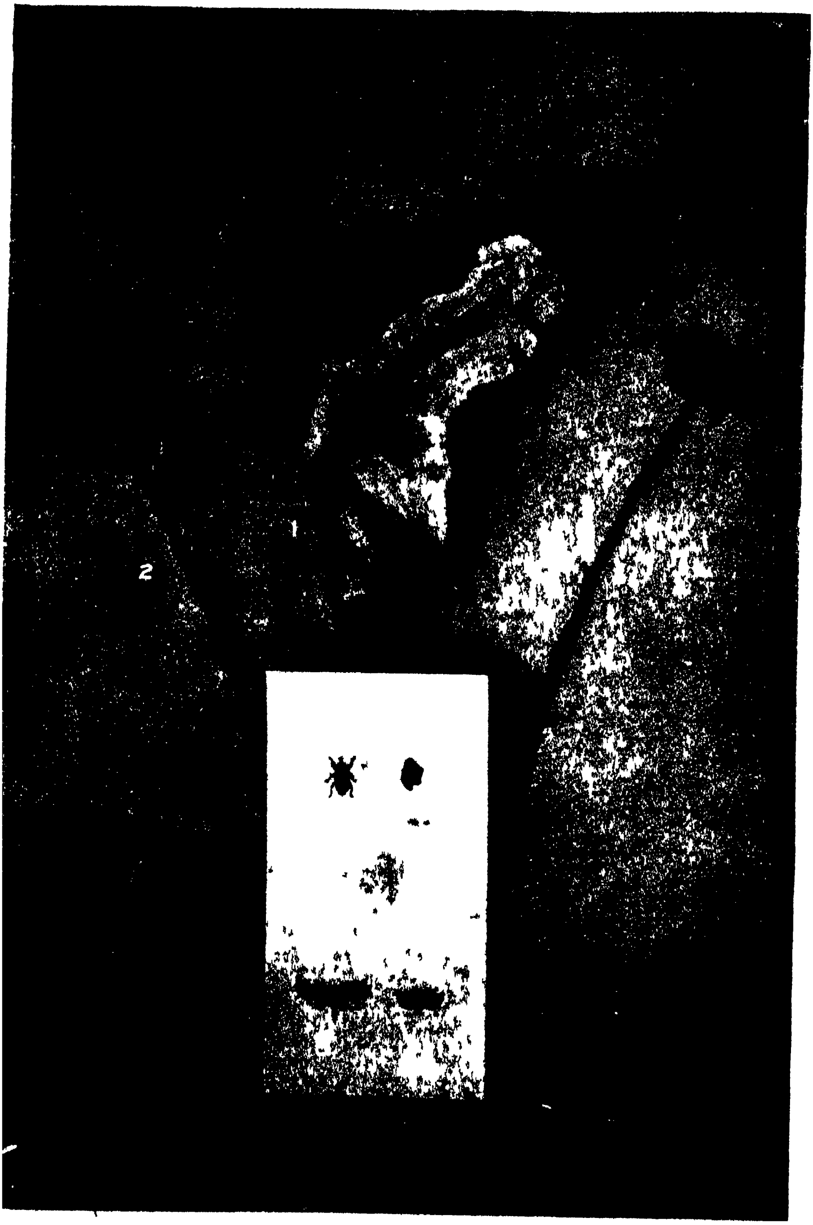
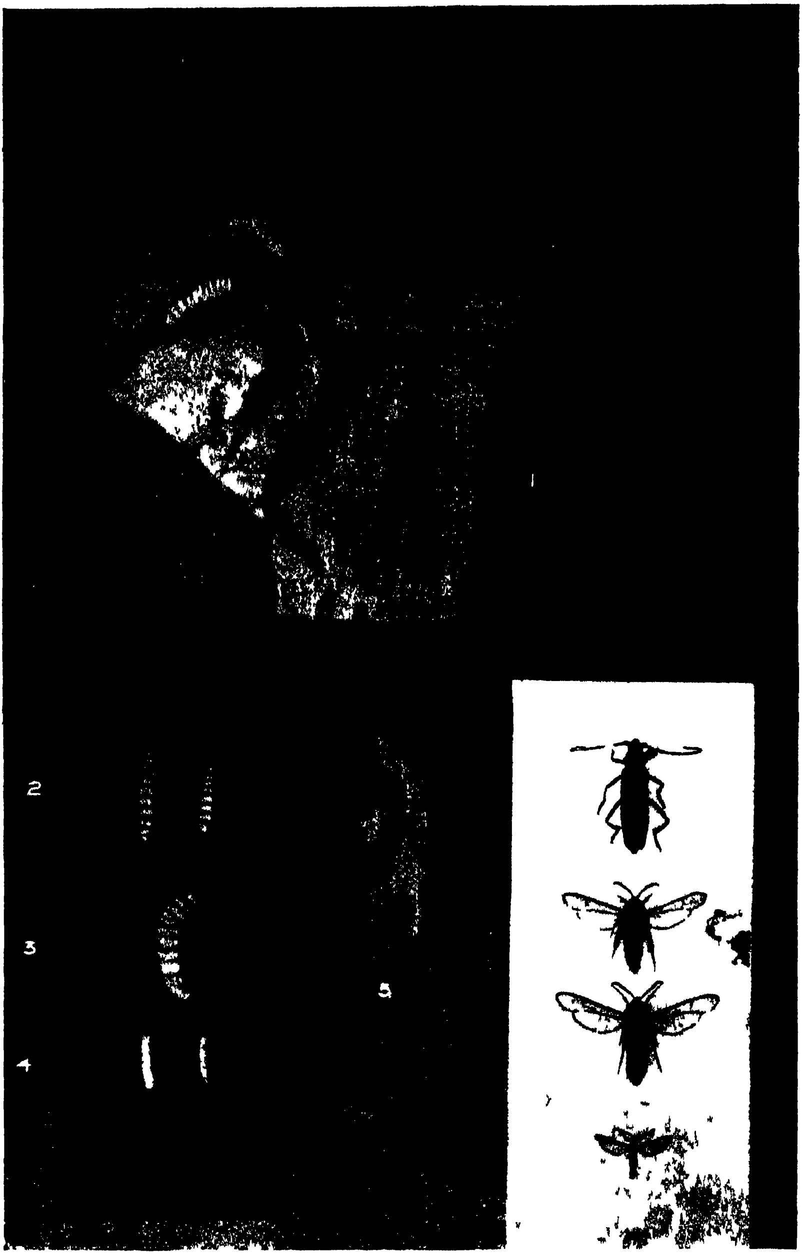


Photo [*R A Malby*

FIG 1—Illustration to show size of Willow Pests
Each Fig is twice natural size

1. Section of stump attacked by larvæ of Willow Weevil 2 and 3 Ends of Rods showing "button top" 4 Willow Weevils 5 Midges which cause "button top" 6 and 7, Small moths whose larvæ cause "bushy top"

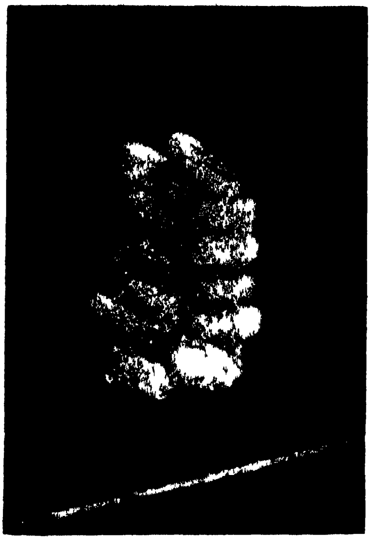


[R A Malby

FIG 2 —Illustration to show size of Willow Pests

Each Fig is twice the natural size

Section of Willow Stump tunnelled by larvæ of Musk Beetle and Clear-Wing Moths 2 Larvæ (young) of Musk Beetle 3 Larvæ (young) of Hornet Clear Wing Moth 4 Larvæ (young) of Red Tipped Clear Wing Moth 5 Section of Stump to show attack by larvæ of Musk Beetle 6 Adult Musk Beetle 7 Hornet Clear Wing Moths (2) 8 Red Tipped Clear-Wing Moth



IG 3 —Eggs of Willow Beetle (*Phyllodecta vulgatissima*) greatly magnified (× 12) on underside of leaf The hairiness of the leaf has been suppressed in order that the eggs may show more clearly

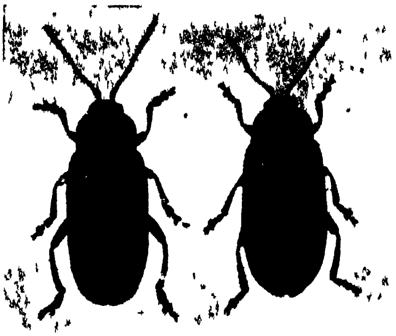


FIG 4 —Willow Beetles (*P vulgatissima*) Magnified (× 6)

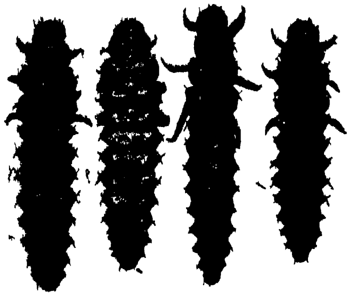


FIG 5 —Larvæ (or young) of Willow Beetles (*P vulgatissima*) Magnified (× 5 approx)

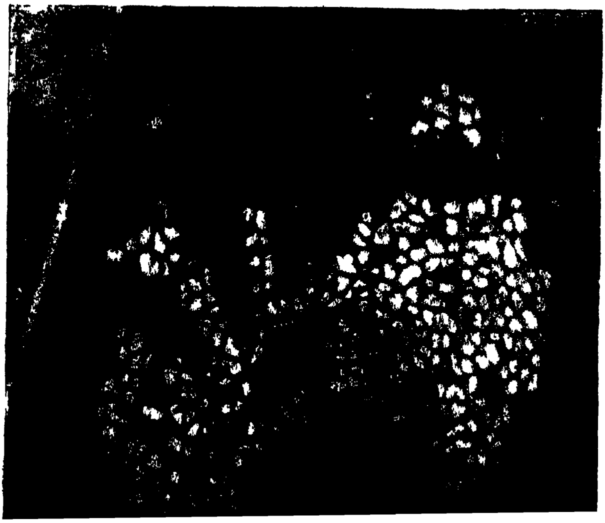


FIG 6 —Larvæ (young) of Willow Beetle, newly hatched. Greatly magnified (× 12 approx).

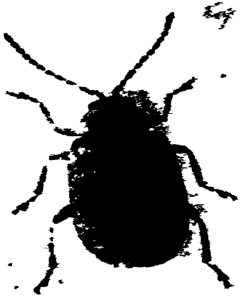


FIG 7.—Galerucella Beetle (*G lineola*) magnified (× 6)

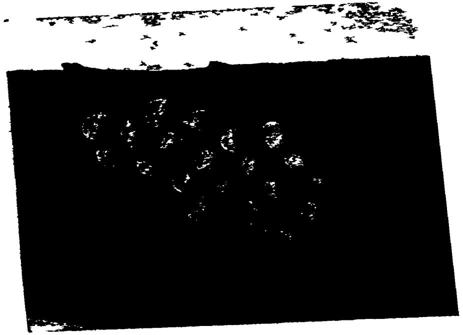


FIG 8.—Eggs of Galerucella Beetle (*G. lineola*) on upperside of willow leaf Magnified (× 10 approx)

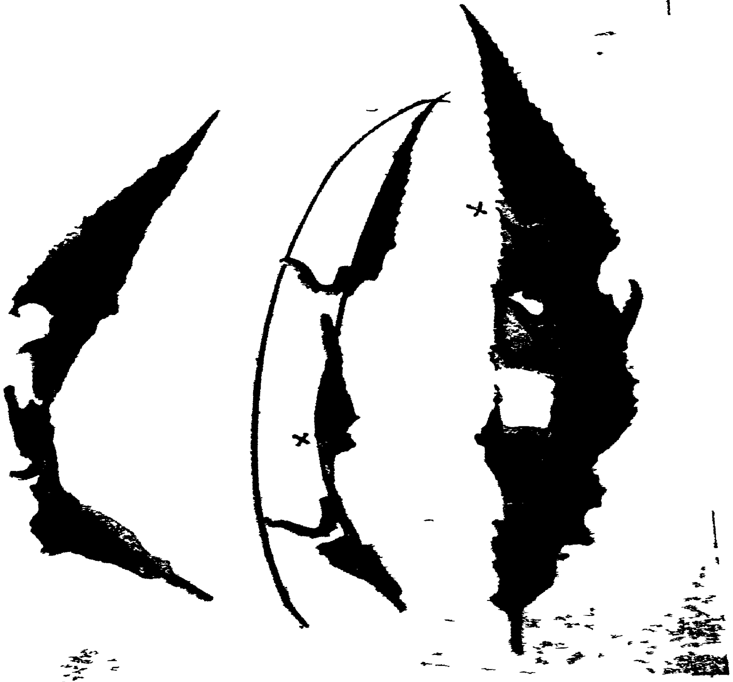


FIG 9.—Sawfly larvæ on Willow leaves: in the centre one midrib stripped, and one nearly so Showing "bean galls" at ×

of two years' growth or more. The larva of the Red Tipped Clearwing lives mainly on the stumps. The larvæ of both species pupate in the spring in the burrows, and the moths emerge in June and July. The damage done by these insects is not very evident unless a few stumps are cut open, when it is often found that the wood is tunnelled in all directions by the larvæ, which at first reduce the productiveness of the stump and later kill it altogether. These two species and the Willow Weevil (*Cryptorrhynchus lapathi*) are the insects chiefly responsible for the decay of stumps.

Willow Gall Midges.—These insects in the adult stage are minute midges or flies. The most injurious species lay eggs in the terminal buds of the rods, which subsequently fail to develop normally and become bunched together or form a distinct rosette. These galls are usually known as buttons or button tops. In the galls are found one or more minute orange-red larvæ, which, when full fed, either pupate in the galls or fall out and pupate in the soil. There appears to be two generations in the year, and it is believed that the winter is spent as a larva in the galls, but statements on these points do not always agree.

The most injurious species is known as *Cecidomyia heterobia*, and may be recognised by the fact that the buttons contain many larvæ and are rather shapeless, not as a rule in the form of a neat rosette. A second species, *Cecidomyia rosaria*, produces galls which may be distinguished by the fact that they each contain only one larva and are rosette-shaped.

The injury done by these insects is decidedly serious, since attacked rods are stunted and may also be "bushy topped."

There are several other species of gall midge which attack willows, but mention need only be made of the willow wood midge, *Cecidomyia saliciperda*. The larvæ of this insect live in burrows in the rods, usually near the base. They pupate in the burrows and the flies emerge through minute pin holes in the bark. The winter is spent in the larval condition in the rods.

Attacked rods, which are more often of two years' growth, are of little value as the attacked portion is weak and must be cut away.

Methods of Control.—No suggestions as to practical methods of control have been given in the preceding sections since the few forms of treatment known may be applied in the case of attack by several kinds of pest. Notes under this heading may be divided into (1) direct measures which may be adopted when an attack is expected or is actually in progress; (2)

feeding insects of all kinds, and must act as centres from which these insects spread to the neighbouring beds. If willow trees are needed they should be of a variety which will pay for proper attention, and they should not be pollarded. Neglected and decayed willows, poplars or alders are all undesirable in the neighbourhood of willow beds.

Willow stumps which are partly dead or weak are usually attacked by the insects which burrow inside, such as the larvæ of *Cryptorrhynchus lapathi* and of the Clearwing Moths. Such stumps should be removed and burnt as soon as the rods are cut. If they are left, the insects will emerge and attack fresh stumps, and the bed will gradually become unproductive.

Blast Furnace Flue Dust as a Potash Manure.*

BEFORE the War practically the entire supply of potash manure used in this country was derived from German sources, and during the last three years little potash has been available for farmers. The cessation of supplies has to some extent been counteracted by drawing upon reserves present in the soil from previous manurings, and by making the most of the natural sources of potash in farmyard manure, seaweed, wood ashes, etc., and by the use of salt, which liberates potash from the reserves of the soil; but there can be no doubt that the production of certain crops, especially potatoes, has in some instances suffered through lack of potash.

A home source of potash has recently been discovered in the flue dust obtained from blast furnaces, and the supplies of this dust will go far to counteract the deficiency of potash from other sources.

Arrangements have been made by the Food Production Department, in conjunction with the Ministry of Munitions, for the sale of blast furnace flue dust by agents approved by the Department to farmers for direct application to the soil. The amount of potash in the flue dust varies considerably. At present four grades are on the market, their composition and prices f.o.r. being as follows:—

Grade.	*Percentage of Potash (K_2O).*	*Equal to Sulphate of Potash (K_2SO_4).*	*Price per ton f.o.r. in bags.*	
	Per cent.	*Per cent.*	*s.*	*d*
No 1	2¾– 3¼	5– 6	37	6
" 1A	3¼– 5½	6–10	46	6
" 2	5½– 9¾	10–18	60	0
" 3	9¾–13	18–24	100	6

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* Food Production Leaflet No. 23, copies of which may be obtained free from the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

If desired, the flue dust will be supplied unbagged at a cost of 15*s*. per ton less than the above prices, but except in the case of the lower grades, for which the cost of bagging is relatively excessive, it will be better to buy in bags. Since the cost of carriage is the same for a ton of low-grade material as for that of the best quality, purchasers at a distance will find it to their advantage to select better qualities. The scheme is at present only in its initial stages, and the demand may prove greater than the supply. Farmers should therefore be prepared to take those grades which agents are in a position to supply.

Farmers desiring supplies of blast furnace flue dust should apply to one or other of the approved agents for their county. A list of such agents may be obtained on application to the County Agricultural Executive Committee, or to the Food Production Department, 72, Victoria Street, London, S.W. 1.

Farmers whose premises are situated near blast furnaces will be at liberty to obtain supplies of Grades Nos. 1 and 1A only, direct from the furnaces in their own carts on terms to be arranged between them and the sellers, instead of purchasing through the approved agents.

The sale of this material by approved agents is prohibited except for direct application to the soil, and farmers must give an undertaking that any quantity purchased by them will be so used and not resold to any other person. Blast furnace flue dust must not be used as an ingredient in compound manures prepared for sale.

Application.—As the supply of these blast furnace dusts is limited, it is important that they should be used to the best advantage, and there can be no doubt that preference should be given to the potato crop. This is the crop that responds most markedly to potash manure, and at the same time is the farm crop which gives the greatest return of human food per acre. Most potato growers, particularly those who farm very light soils, are well aware of the effect of potash on this crop. Owing to the fact that part of the potash in the flue dust is insoluble, the manure should be applied some time before the crop is to be planted. There need be no fear of loss, as even the most soluble forms of potash are rapidly absorbed by the soil and held until taken up by the plant. The application to the soil in advance has the further advantage that it removes all possibility of damage by the small quantities of injurious substances which occur in some samples, though usually the amount is too small to cause any anxiety even if applied direct to the crop.

The quantity which should be applied per acre will naturally depend on the grade used and the character of the soil. Under pre-war conditions a common dressing for use along with, say, 10 tons of dung, 1 cwt. sulphate of ammonia and 3 cwt. of superphosphate was 1 cwt. sulphate of potash, "80 per cent. pure." Corresponding quantities of the four grades of flue dust would be :—

Grade.	*Amount equal to 1 cwt. Sulphate of Potash* (80 *per cent. pure.*)
1	13 to 16 cwt.
1A	8 „ 13 „
2	4½ „ 8 „
3	3½ „ 4½ „

Under existing conditions half of the foregoing quantities of flue dust should be applied to potatoes when farmyard manure is available, and the full dressings where artificial manures only are employed.

It is probable that the available supplies will be promptly taken up by potato growers, but any surplus might be devoted to mangolds and swedes on rather light or peaty soils. In view of the urgent need for the largest possible potato crop it would not be justifiable to use large quantities for other crops, and not more than half the dressings recommended for potatoes should be given.

A word of warning to intending purchasers is necessary. The flue dust referred to in this leaflet is a special material obtained from the flues of certain blast furnaces. Ordinary flue dust obtained from factory furnaces, etc., contains practically no potash and is almost worthless as a manure.

Economy in the Feeding of Horses.*

THE purpose of this leaflet is to supply guidance as to the food requirements of the horse under various conditions, and to indicate the directions in which any economies that can be effected will be most serviceable to the national interest at the present juncture. It deals mainly with the feeding of the working horse on the farm, but the information given, with certain indicated modifications, is generally applicable to all kinds of working horses.

The work of the farm can only be satisfactorily discharged if the horses are adequately fed, but this cannot be made an excuse for extravagance. Upon the care which is exercised to ensure that the horses get no more than their just needs will depend the supplies of food available for other classes of stock, and to some extent even for human consumption.

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* Food Production Leaflet No. 17, copies of which may be obtained free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

Horses not at Work.—The case of *horses not at work* can be dealt with in a few words. Idle horses or horses at very light work require no corn or other concentrated food. Under present conditions such horses should be fed entirely on grass, and only in winter, if at all, will need other food, which should be given in the form of hay and straw, with occasionally a little extra food, such as bran or pollards, when weather conditions are very adverse. The same will apply to the working horse in his periods of idleness, if these are prolonged. For short periods, however, as between the hay and corn harvests, it will be desirable to maintain the condition of the horse by more liberal feeding, although this should be well below the level of the feeding on working days.

Stallions and Brood Mares.—The case of the *stallion and brood mare* may also be briefly dismissed, since their feeding (subject to the maximum rations laid down in the Horses' Rationing Order) must necessarily continue on lines which have proved satisfactory, and affords less risk of extravagance, because excessive feeding of such animals is likely to bring its own retribution.

Working Horses.—The only case needing more detailed consideration is that of the *working horse.*

The needs of the horse at work will vary with its weight, the amount of work, and the character of the work it is called upon to perform.

A heavy horse will need more food than a light horse on similar work, but will be able to consume greater quantities of bulky food, such as hay or straw.

In considering the food-requirements for the actual production of work, it must be borne in mind that if the food does not provide sufficient energy for this purpose, the horse must draw upon its body-tissues for the necessary balance, with the inevitable result that it will lose condition and rapidly become less efficient. Further, more energy, and therefore more food, is required by the horse doing its work at a fast pace than if the same work be done at a slow pace. Again, since the fast-moving horse must be able to draw on supplies of energy more quickly, it must receive its food in more digestible form; in other words it must get more concentrated food and less coarse fodder. Briefly summarised, the horse must be fed according to its weight, the amount of work set for it, and the rate at which this is to be done. Generally speaking, the heavier the horse and the slower the rate of working, the greater may be the proportion of bulky fodder (green stuff, hay, straw, chaff and roots) in the ration, and the smaller correspondingly the proportion of concentrated food required.

The foregoing considerations must be kept in mind in connection with the examples of rations given below, which are intended to apply to the farm horse of average weight, say about 14 cwt. live-weight, doing an ordinary, not very severe, day's work. Light horses will require about one-third less, and the heaviest horses about a quarter more, hay and straw. The latter should also get a little more corn or other concentrated food than the amounts suggested when their work is very severe.

The total requirements of the "vanner," or other medium-weight horse doing considerable work at a fair pace, will be roughly those of the average farm horse, but the proportion of concentrated food to hay and straw should be greater.

For such average condition the total food supply per horse per day, including the dry matter of any greenstuff or roots fed,* should be 28–36 lb., the higher figure being approached where straw is fed in appreciable quantity. In normal times roughly one-half of the ration (or rather more if straw be fed) would consist of coarse fodder and the rest concentrated foods. Now, however, it is highly desirable that the proportion of coarse fodder should be increased as far as is consistent with efficiency, and the supply of corn or meal correspondingly reduced. For this purpose 2½ lb. of good hay or 4–5 lb. of oat straw may be regarded as roughly equivalent to 1 lb. of corn or other concentrated food.

Undoubtedly economy of food is effected by chaffing at least a portion of the hay and straw, since not only is there then less direct waste of the coarse fodder, but a more efficient mastication of the concentrated foods can be ensured by mixing them with the moistened, chaffed fodder. Further, although many horse-keepers prefer to feed oats whole, there can be no doubt that oats fed in this way are very often imperfectly digested. It is desirable, therefore, under present conditions, that oats, if used at all, should be crushed before feeding. This should certainly be the invariable practice in the case of horses with bad teeth, and with "bolters."

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* The dry matter in greenstuff and roots may be taken at one-fifth and one-eighth, respectively, of the weight of the fresh material.

The suitability of roots for horse-feeding must also not be lost sight of; but these should be used, in the case of the farm horse at any rate, to reduce the consumption of corn and meals, rather than as substitutes for hay and straw. The most suitable roots are carrots, mangolds and swedes. Under present circumstances, where carrots and swedes are in demand for human consumption, mangolds, if available, should be preferred for horses. For the foregoing purpose 7 lb. carrots or 9 lb. swedes or mangolds may be taken as roughly equivalent to 1 lb. of oats or mixed meals.

With regard to the allowance of concentrated foods, it is urgently necessary at the present juncture that the consumption of oats by horses shall be reduced, and, further, that other materials, such as maize, beans and peas, which can serve for direct human consumption, shall be drawn upon as little as possible. Much may be done to keep their consumption within very modest limits, if full use is made of the various alternative feeding-stuffs which have been found by experience to be safe and satisfactory for horse-feeding purposes. These alternatives are more numerous than is commonly supposed, and include wheat, bran, pollards, middlings, dried brewers' grains, malt culms, maize gluten feed, linseed, linseed oil, linseed cake and meal, palm kernel cake and meal, coconut cake, ground nut cake, dried yeast and molasses. Rice meal, when available, is also very useful. The amounts of most of these which may be usefully included in rations are indicated below.

Rations.—*Attention is called to the Horses' Rationing Order No. 2, 1917, a copy of which may be obtained from any bookseller, or from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2 (price 1d.).*

This Order specifies the maximum rations of oats, maize, beans or peas that may be fed to any horse, but allows the unrestricted use of hay, straw, bran or dried brewers' grains. Horses maintained and used exclusively for agricultural purposes are excluded from the operation of the Order. Horses used for pleasure purposes, with certain specified exceptions, are not allowed any grain rations.

The following rations are intended to be regarded as equivalent to the oats in a ration of 14 lb. hay + 14 lb. oats. The hay may be partially replaced by straw in the proportion of 2 lb. straw to 1 lb. hay, up to a maximum of, say, 10 lb. of straw. On some farms where straw is abundant and of good quality it is used exclusively. It is very desirable that straw should be used to the fullest extent.* Roots to the extent of 7–14 lb. should be included when available, the allowance of corn or meals being then reduced by 1–2 lb.

(A) *Rations including* 10 *lb. Oats* :—

1.	2.	3.
10 lb. oats.	10 lb. oats.	10 lb. oats.
1½ ,, maize.	1½ ,, maize gluten feed.	1 ,, linseed cake.
1½ ,, beans or peas.	2 ,, dried grains.	1½ ,, palm kernel cake or coconut cake.
		1½ ,, bran.

(B) *Rations including* 5 *lb. Oats* :—

1.	2.	3.
5 lb. oats.	5 lb. oats.	5 lb. oats.
3 ,, maize.	3 ,, maize gluten feed.	4 ,, dried grains.
3 ,, beans or peas.	3 ,, dried grains.	4 ,, sharps or 4½ lb. bran.
2 ,, bran.	3 ,, palm kernel cake or coconut cake.	1 ,, linseed cake.

(C) *Rations without Oats* :—

1.	2.	3.
5 lb. maize.	6 lb. dried grains.	5 lb. dried grains.
5 ,, dried grains	3½ ,, maize gluten feed.	5 ,, sharps.
3 ,, beans or peas.	3½ ,, palm kernel cake or coconut cake.	2½ ,, beans or peas.
	¾ ,, crushed linseed or 4 oz. linseed oil.	2 ,, maize gluten feed.

In drawing up other rations the various feeding-stuffs may be assumed to be roughly equivalent to oats in the following proportions :—

10 lb. oats =
7½ lb. maize.
9 ,, beans, peas, barley, fine middlings, oil-cake, or maize gluten feed.
11 ,, sharps or pollards.
12 ,, bran, dried grains, or malt culms.

In the case of foods not known to be safe to feed in larger quantities the amount included in the ration should not exceed 2 or 3 lb.

Further notes as to suitable rations for horses are given monthly in this *Journal.* A reprint of these notes, and copies of any of the Board's Leaflets, may be obtained free of charge and post free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London. S.W. 1.

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* See also Food Production Leaflet No. 20 (*The Use of Straw for Fodder*).

The Use of Sulphate of Ammonia as Manure.*

IN view of the importance of using every effort to grow heavy crops during the War, it is hoped that farmers, in their own interests and in those of the nation generally, will avail themselves without delay of the present opportunity of obtaining supplies of sulphate of ammonia for spring use.

In the following statement, based on field experiments, an attempt is made to show the average increase in the various crops, and the value of such increase, that may be expected from the use, under suitable conditions, of 1 cwt. of sulphate of ammonia per acre. The crops have been valued at prices considerably under those now ruling in the London and other markets :—

		£	s.	d.	£	s.	d.
Wheat	4 bush. at 55*s*. per qr. (504 lb.) =	1	7	6	1	17	6
„ Straw ..	5 cwt at 40*s* per ton .. =	0	10	0			
Barley	5 bush. at 50*s* per qr. (448 lb.) =	1	11	3	2	0	3
„ Straw ..	6 cwt at 30*s* per ton .. =	0	9	0			
Oats	6 bush. at 30*s*. per qr. (336 lb.) =	1	2	6	1	16	6
„ Straw ..	7 cwt. at 40*s*. per ton .. =	0	14	0			
Rye-grass Hay ..	10 cwt. at 100*s*. per ton .. =				2	10	0
Meadow Hay ..	8 cwt. at 90*s*. per ton .. =				1	16	0
Mangolds ..	32 cwt. at 12*s*. 6*d*. per ton.. =				1	0	0
Potatoes ..	20 cwt. at 60*s*. per ton .. =				3	0	0

Consideration of the foregoing figures shows that there is ample justification for the use of sulphate of ammonia at the present time.

Of the two chief classes of manures, nitrogenous and phosphatic, the former are usually the more effective in increasing the yield of the crop. Where nitrogen is given freely, whether in the form of dung or of an artificial fertiliser, it is desirable to effect a proper " balance " by applying a dressing of superphosphate (or, in some cases, basic slag, bone meal or mineral phosphate). This prevents undue rankness, hastens maturity, and improves the quality of the produce.

To obtain the best results with sulphate of ammonia it should be incorporated with the soil as far as conditions will allow.

The following are examples of manurial dressings (per acre) suitable in average circumstances for the crops mentioned :—

Wheat.—1 to 1½ cwt. of sulphate of ammonia, applied before harrowing the wheat in spring. Part of this may be applied in autumn.

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* Food Production Leaflet No. 15.

Barley.—¾ to 1 cwt. of sulphate of ammonia and 2 cwt. of superphosphate, applied at seed time and harrowed in.

Oats.—1 to 1¼ cwt. of sulphate of ammonia and 2 cwt. of superphosphate applied at seed time and harrowed in.

Hay (*Rye-grass and Clover*).—If the clover is failing, 1 cwt. of sulphate of ammonia applied in March wiil encourage the rye-grass and ensure a crop of hay. If, however, the clover is strong, sulphate of ammonia should not be given.

Hay (*Meadow*).—1½ cwt. of sulphate of ammonia and 2 cwt. of superphosphate applied in March, or of basic slag applied earlier.

Mangolds—

With Dung.—1 cwt. of sulphate of ammonia, 4 cwt. of superphosphate, 4 cwt. of salt, applied in the drills; 1 cwt. of sulphate of ammonia applied after thinning.

Without Dung.—1½ cwt. of sulphate of ammonia, 6 cwt. of superphosphate, 4 cwt. of salt, applied before the seed is sown; 1 cwt. of sulphate of ammonia applied after thinning.

Swedes, Turnips, Kale, Rape—

With Dung.—½ to 1 cwt. of sulphate ot ammonia and 4 cwt. of superphosphate applied in the drills.

Without Dung.—1 to 1½ cwt. of sulphate of ammonia and 6 cwt. of superphosphate applied before the seed is sown.

Potatoes—

With Dung.—1 cwt. of sulphate of ammonia and 4 cwt. of superphosphate applied in the drills.

Without Dung.—(After ley) 2 cwt. of sulphate of ammonia, 5 cwt. of superphosphate, and 1 cwt. of bone meal applied in the drills.

Phosphatic Manures for Use with Sulphate of Ammonia.—Superphosphate is generally the best form of phosphatic manure for all arable crops, and it may be mixed with sulphate of ammonia before application. Basic slag (which must not be mixed with sulphate of ammonia) may be substituted for superphosphate in a district of ample rainfall and when the land is deficient in lime and rich in organic matter.

The supply of superphosphate may be supplemented by mixing it with bone meal or steamed bone flour, whichever is cheaper.

Prices of Sulphate of Ammonia.—The Food Production Department have made arrangements whereby, until the end of 1917, sulphate of ammonia may be purchased by farmers at £15 15*s.* per ton, 24½ per cent. basis, in maker's single bags, net cash, delivered to consumer's station in any part of the United Kingdom in quantities of not less than two tons.

After the end of the year until 31st May, 1918, the price will be £16 7*s.* 6*d.* per ton. Where, however, the farmer takes delivery at the maker's works for conveyance otherwise than by rail, the price will be 10*s.* per ton less.

Quantities of less than 2 tons may be purchased at slightly higher rates.

Farmers should obtain their supplies as far as possible from the maker or dealer with whom they are accustomed to deal, and take delivery at the earliest date possible. Prompt delivery by rail cannot be relied upon, and farmers are urged to assist railway companies by giving their orders several months in advance of the time the sulphate is actually required. In the event of any difficulty in obtaining supplies, application should be made to the Secretary, Sulphate of Ammonia Distribution Committee, 72, Victoria Street, London, S.W. 1.

Merchants of repute are being recognised by the Agricultural Executive Committees in England and Wales as Approved Agents for the sale of fertilisers, and the names of these merchants can be obtained on application to the Food Production Department, 72 Victoria Street, London, S.W. 1.

Notes on Feeding Stuffs in December:
From the Animal Nutrition Institute, Cambridge University.

THE supplies of all classes of feeding stuffs are again small, and prices have distinctly risen since last month. Linseed cake, cotton cake, palm kernel cake, coconut cake and maize meal are all dearer than last month by from 3*d.* to 5*d.* per food unit. The only commonly used feeding stuff which has fallen in price is ground nut cake, and of this the supplies are not large.

Since writing the above, the Food Controller has fixed the prices of a number of feeding stuffs. These prices are given in Table XI., side by side with the number of food units per ton, and the price per food unit of those feeding stuffs of which reliable analyses are to hand. It is hoped to ascertain the average composition of the rest of the articles in the list in

TABLE I.

Feeding Stuff.	Digestible Food Units.	Approximate Prices per ton at the end of October.									
		London.		Liverpool.		Hull.		Bristol.		Glasgow.	Leith.
		Price.	Supply.	Price.	Supply.	Price.	Supply.*	Price.	Supply.	Price.	Price.
		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	£ s. d.
Soya Bean Cake	122·3	—	None	—	—	—	—	—	—	—	—
Decorticated Cotton Cake	126·3	23 0 0	Very scarce.	23 0 0	Limited	—	—	—	—	—	—
Decorticated Cotton Meal	126·3	—	—	—	—	—	—	—	—	—	—
American Linseed Cake	119·0	—	—	—	—	—	—	—	—	—	—
Indian Linseed Cake	123·1	—	None	—	—	—	—	—	—	23 0 0	—
Russian Linseed Cake	123·5	—	—	—	—	—	—	—	—	—	—
English Linseed Cake	120·1	22 0 0	Scarce	Nominal	—	—	—	—	—	—	22 10 0
Bombay Cotton Cake	65·3	—	None	15 15 0	Limited	—	—	—	—	—	—
Egyptian Cotton Cake	71·9	16 0 0	Scarce	16 15 0	"	—	—	—	—	—	—
Coconut Cake	102·6	—	None	20 10 0	Moderate	—	—	—	—	—	—
Palm Kernel Cake	96·1	16 0 0	Scarce	15 10 0	"	—	—	—	—	—	—
Palm Kernel Meal (extracted)	92·5	—	—	—	—	—	—	—	—	—	—
Ground-nut Cake	145·2	19 0 0	Small	19 2 6	Moderate	—	—	—	—	—	—
English Beans	99·5	25 5 3	"	23 11 3	Limited	23 3 2	—	—	—	—	—
Bean Meal	99·5	—	—	—	—	—	—	—	—	25 10 0	25 10 0
Chinese Beans	101·1	21 17 6	Fair	22 17 4	Limited	—	—	—	—	—	—
English Maple Peas	97·2	24 17 6	Moderate	—	—	24 8 11	—	—	—	—	—
English Dun Peas	97·2	23 2 3	Fair	—	—	24 8 11	—	—	—	—	—
Calcutta White Peas	97·5	29 6 8	Small	—	—	—	—	—	—	—	—
Karachi Peas	97·5	—	—	—	—	28 17 9	—	—	—	—	—
American Maize	93·8	—	None	—	—	—	—	—	—	—	—
Argentine Maize	94·2	—	"	—	—	—	—	—	—	—	—
Maize Meal	86·5	21 0 0	Moderate	—	—	—	—	—	—	—	—
Maize Gluten Feed	121·6	19 0 0	"	20 0 0	Scarce	—	—	20 0 0	Small	—	—
Maize Germ Meal	99·2	19 0 0	"	—	—	—	—	—	—	—	—

* No information stated.

TABLE I.—*continued.*

Feeding Stuff.	Digestible Food Units.	Approximate Prices per ton at the end of October.									
		London.		Liverpool.		Hull.		Bristol.		Glasgow.	Leith.
		Price.	Supply.	Price.	Supply.	Price.	Supply.*	Price.	Supply.	Price.	Price.
		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	£ s. d.
English Feeding Barley	83·0	15 13 7	Little	—	—	15 8 0	—	—	—	—	—
English Oats	75·4	15 1 8	Fair	—	—	14 15 0	—	15 8 4	Fair	—	—
Argentine Oats	75·4	—	—	—	—	—	—	—	—	—	—
Malt Culms	69·9	15 0 0	Moderate	—	—	14 0 0	—	—	—	—	15 10 0
Brewers' Grains (dried)	84·5	16 17 6	Improving	—	—	16 0 0	—	17 0 0	—	16 17 6	16 15 0
Brewers' Grains (wet)	21·1	2 9 6	"	—	—	2 0 0	—	—	—	—	—
Distillers' Grains (English)	101·2	17 10 0	"	—	—	—	—	17 15 0	—	} 17 0 0	17 5 0
Distillers' Grains (French)	101·2	17 10 0	"	—	—	—	—	—	—		—
Distillers' Mixed Grains (wet)	20·0	—	—	—	—	—	—	—	—	—	—
Egyptian Rice Meal	78·7	20 0 0	Small	—	—	—	—	—	—	—	—
Burmese Rice Meal	78·7	17 0 0	"	—	—	—	—	—	—	—	—
Rice Bran	78·7	—	—	—	—	—	—	—	—	—	—
Wheat Middlings (coarse)	92·0	15 0 0	Small	—	—	15 0 0	—	—	—	16 5 0	15 10 0
Wheat Sharps	92·0	—	None	15 15 0	Small	15 0 0	—	15 10 0	Small	14 15 0	15 0 0
Wheat Pollards	87·0	—	—	14 17 6	"	—	—	—	—	—	—
Wheat Bran	77·5	13 1 3	Small	—	—	14 0 0	—	13 10 0	Fair	14 5 0	14 0 0
Wheat Bran (broad)	79·9	14 1 3	"	15 0 0	Small	16 0 0	—	14 10 0	"	14 10 0	15 0 0
Feeding Treacle	60·0	22 18 9	"	22 10 0	Moderate	—	—	—	—	—	27 0 0
Linseed	153·5	30 0 0	"	—	Small	—	—	32 0 0	Small	—	‡34 0 0
Linseed Oil	250·0	58 0 0	Fair	†62 0 0	Limited	58 0 0	—	5*s*. 6*d*. per gal.	—	—	—
Egyptian Cotton Seed	108·6	17 0 0	Small	—	"	—	—	—	—	—	—
Bombay Cotton Seed..	99·6	—	—	—	—	—	—	—	—	—	—
Cotton Seed Oil	250·0	60 0 0	Fair	79 0 0	Limited	—	—	—	—	—	—
Fish Meal	145·0	—	—	—	—	—	—	—	—	18 10 0	18 0 0

* No information stated. † In barrels. ‡ Crushed.

time for next month's notes. The prices quoted are subject to certain variations, for which see the Food Controller's Order, printed in this issue of the *Journal.*

It will be noted that the fixed prices will make an appreciable reduction in the cost of feeding animals. This can be seen by comparing them with the prices per ton at the end of October

TABLE II.

LONDON. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet) ..	2	4	English oats	3	11¾
Ground nut cake ..	2	7½	Brewers' grains (dried)	4	0
Egyptian cotton seed ..	3	1½	Malt culms	4	3½
Maize gluten feed ..	3	1¾	Burmese rice meal ..	4	4
Wheat middlings ..	3	3	Chinese beans	4	4
Palm nut cake	3	4	Egyptian cotton cake ..	4	5½
Wheat bran	3	4½	Linseed oil	4	7¾
Distillers' grains (English)	3	5½	English dun peas ..	4	9
Distillers' grains (French)	3	5½	Cotton seed oil	4	9½
Wheat bran (broad) ..	3	6	Maize meal	4	10¼
Decorticated cotton cake	3	7½	English beans	5	1
English linseed cake ..	3	8	Egyptian rice meal ..	5	1¼
English feeding barley ..	3	9¼	English maple peas ..	5	1¼
Maize germ meal ..	3	10	Calcutta white peas ..	6	0
Linseed	3	11	Feeding treacle	7	7½

TABLE III.

LIVERPOOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Ground nut cake ..	2	7½	Chinese beans	4	6¼
Palm nut cake	3	2¾	Egyptian cotton cake ..	4	8
Maize gluten feed ..	3	3½	English beans	4	8¾
Wheat pollards	3	5	Bombay cotton cake ..	4	10
Wheat sharps	3	5¼	Linseed oil	4	11½
Decorticated cotton cake	3	7½	Cotton seed oil	6	4
Wheat bran (broad) ..	3	9	Feeding treacle	7	6
Coconut cake	3	11¾			

TABLE IV.

HULL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Brewers' grains (wet) ..	1	10¾	Wheat bran (broad) ..	4	0
Wheat middlings ..	3	3	Malt culms	4	0
Wheat sharps	3	3¼	English beans	4	7¾
Wheat bran	3	7½	Linseed oil	4	7¾
English feeding barley ..	3	8½	English maple peas ..	5	0¼
Brewers' grains (dried) ..	3	9¾	English dun peas ..	5	0¼
English oats	3	11	Karachi peas	5	11

TABLE V.

BRISTOL. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Maize gluten feed	3	3½	Wheat bran (broad)	3	7½
Wheat sharps	3	4¼	Brewers' grains (dried)	4	0¼
Wheat bran	3	5¾	English oats	4	1
Distillers' grains (English)	3	6	Linseed	4	2¼

TABLE VI.

AVERAGE PRICES PER FOOD UNIT.

LONDON, LIVERPOOL, HULL, AND BRISTOL.

	s.	d.		s.	d.
Brewers' grains (wet)	2	1½	English oats	4	0
Ground nut cake	2	7½	Linseed	4	0½
Egyptian cotton seed	3	1½	Malt culms	4	1¾
Maize gluten feed	3	3	Burmese rice meal	4	4
Wheat middlings	3	3	Chinese beans	4	5
Palm nut cake	3	3½	Egyptian cotton cake	4	6¾
Wheat sharps	3	4¼	Linseed oil	4	9
Wheat pollards	3	5	English beans	4	9¾
Distillers' grains (French)	3	5½	Bombay cotton cake	4	10
Distillers' grains (English)	3	5¾	Maize meal	4	10¼
Wheat bran	3	6	English dun peas	4	10½
Decorticated cotton cake	3	7½	English maple peas	5	0¾
English linseed cake	3	8	Egyptian rice meal	5	1¼
Wheat bran (broad)	3	8½	Cotton seed oil	5	6¾
Brewers' grains (dried)	3	8½	Karachi peas	5	11
English feeding barley	3	9	Calcutta white peas	6	0
Maize germ meal	3	10	Feeding treacle	7	6¾
Coconut cake	3	11¾			

TABLE VII.

GLASGOW. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	6½	Wheat bran (broad)	3	7½
Wheat sharps	3	2½	Wheat bran	3	8¼
Distillery mixed grains (dried)	3	4½	Indian linseed cake	3	9
			Brewers' grains (dried)	3	11¾
Wheat middlings	3	6½	Bean meal	5	1½

TABLE VIII.

LEITH. PRICES PER FOOD UNIT.

	s.	d.		s.	d.
Fish meal	2	5¾	Wheat bran (broad)	3	9
Wheat sharps	3	3	Brewers' grains (dried)	3	11½
Wheat middlings	3	4½	Malt culms	4	5½
Distillery mixed grains (dried)	3	5	Linseed (crushed)	4	5½
			Bean meal	5	1½
Wheat bran	3	7¼	Feeding treacle	9	0
English linseed cake	3	9			

TABLE IX.

AVERAGE PRICES PER FOOD UNIT.

GLASGOW AND LEITH.

	s.	d.		s.	d.
Fish meal	2	6	English linseed cake ..	3	9
Wheat sharps	3	2¾	Indian linseed cake ..	3	9
Distillery mixed grains (dried)	3	4¾	Brewers' grains (dried)	3	11½
Wheat middlings ..	3	5½	Malt culms	4	5½
Wheat bran	3	7¾	Linseed (crushed) ..	4	5½
Wheat bran (broad) ..	3	8¼	Bean meal	5	1½
			Feeding treacle	9	0

TABLE X.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Name of Feeding Stuff.	Nutritive Ratio.	Per cent. digestible.			Starch equiv. per 100 lb.	Linseed Cake equiv. per 100 lb.
		Protein.	Fat.	Carbo-hydrates and Fibre.		
		Foods Rich in both Protein and Oil or Fat.				
Ground nut cake	1: 0·8	45·2	6·3	21·1	77·5	102
Soya bean cake	1: 1·1	34·0	6·5	21·0	66·7	88
Decort. cotton cake ..	1: 1·2	34·0	8·5	20·0	71·0	93
Linseed cake, Indian ..	1: 1·9	27·8	9·3	30·1	77·1	101
Linseed cake, English ..	1: 2·0	26·7	9·3	30·1	76·0	100
Cotton cake, Egyptian ..	1: 2·1	15·5	5·3	20·0	40·0	53
Cotton cake, Bombay ..	1: 2·5	13·1	4·4	21·5	37·6	49
Distillers' grains (English) Distillers' grains (French)	1: 2·9	18·7	10·2	29·0	57·3	75
Maize gluten feed	1: 3·0	20·4	8·8	48·4	87·4	115
Brewers' grains, dried ..	1: 3·5	14·1	6·6	32·7	50·3	66
Coconut cake	1: 3·8	16·3	8·2	41·4	76·5	101
Palm kernel cake	1: 4·5	14·1	6·1	48·9	76·7	101
Linseed	1: 5·9	18·1	34·7	20·1	119·2	157
Bombay cotton seed ..	1: 6·0	11·0	16·8	30·1	77·5	102
		Fairly Rich in Protein, Rich in Oil.				
Maize germ meal	1: 8·5	9·0	6·2	61·2	81·0	107
Rice meal	1: 9·4	6·8	10·2	38·2	68·4	90
		Rich in Protein, Poor in Oil.				
Fish meal	1: 0·1	54·0	4·0	—	60·0	78
Peas, Calcutta white ..	1: 2·1	23·3	1·1	45·9	66·9	88
Beans, English	1: 2·6	19·3	1·2	48·2	67·0	88
Beans, Chinese	1: 2·6	19·6	1·7	47·9	67·0	88
Peas, English maple ..	1: 3·1	17·0	1·0	50·0	70·0	92
Palm-nut meal (extracted)	1: 3·4	15·6	1·9	48·7	66·1	87
Brewers' grains, wet ..	1: 3·5	3·5	1·5	8·6	12·7	17
Malt culms	1: 3·6	11·4	1·1	38·6	38·7	51
		Cereals, Rich in Starch, not Rich in Protein or Oil.				
Barley, feeding	1: 8·0	8·0	2·1	57·8	67·9	89
Oats, English	1: 8·0	7·2	4·0	47·4	59·7	79
Oats, Argentine	1: 8·0	7·2	4·0	47·4	59·7	79
Maize, American	1: 11·5	6·7	4·5	65·8	81·0	107
Maize, Argentine	1: 11·3	6·8	4·5	65·8	83·5	110
Maize meal	1: 13·0	5·5	3·5	63·9	77·8	102
Wheat middlings, fine ..	1: 4·8	13·2	3·0	53·8	72·0	95
Wheat middlings, coarse, or sharps	1: 5·1	13·8	4·3	50·5	64·0	84
Wheat pollards	1: 4·5	11·6	4·0	51·6	60·0	79
Wheat bran	1: 4·7	11·3	3·0	45·0	49·7	65
Wheat bran, broad ..	1: 4·7	11·3	3·0	45·4	48·1	63
Locust bean meal	1: 22·1	4·0	0·7	69·2	71·4	94

as quoted in Table I., or with the average prices per food unit as quoted in Table VI.

Horses.—Most farmers will no doubt use home-grown oats for their horses in order to save the trouble of delivering the oats and bringing back other feeding stuffs. If allowance is made for the expense of carting, there is no great economy in substituting other food for oats (see also p. 854.)

Milking Cows.—The Food Controller has now fixed prices for most feeding stuffs, but his arrangements for giving priority for feeding stuffs for milking cows are apparently still not complete. In these circumstances, all that can be said is that cow-keepers who have not yet bought all the cake and meal they require will have to buy what they can get. It may assist them to note that the cheapest cakes suitable for milking cows are ground nut and palm kernel.

TABLE XI.

Name of Feeding Stuff	Fixed Price per ton			No. of Food Units per ton	Price per Food Unit.	
	£	s	d		s	d
Cakes (British made)—						
Linseed Cake	19	0	0	120 1	3	2
Cotton Seed Cake	14	10	0	—	—	
Ground Nut, undecorticated	17	5	0	—	—	
Ground Nut, decorticated	19	0	0	145 2	2	7½
Palm Kernel Cake	13	15	0	96 1	2	10¼
Rape Cake	14	0	0	—	—	
Copra or Coconut Cake	15	5	0	102 6	2	11½
Sesame Cake	16	1	0	—	—	
Meals (British made)—						
Palm Kernel Meal	13	10	0	92·5	2	11
Rape Meal	14	0	0	—	—	
Soya Bean Meal	18	15	0	—	—	
Cakes and Meals (imported)—						
American Linseed Cake	19	5	0	119·0	3	3
Argentine Linseed Cake	19	15	0	—	—	
Canadian Linseed Cake	19	10	0	—	—	
Australian Linseed Cake	19	10	0	—	—	
Spanish and Portuguese Linseed Cake	19	10	0	—	—	
Egyptian Cotton Cake	15	0	0	71·9	4	2
Decorticated Cotton Seed Meal	19	15	0	—	—	
Decorticated Cotton Seed Cake	19	15	0	126 3	3	1½
Re-pressed Cotton Cake	20	15	0	—	—	
Rangoon Rice Meal	16	10	0	78·7	4	2½
Italian Rice Meal	14	10	0	—	—	
Canadian Rice Meal	17	0	0	—	—	
Egyptian Rice Meal	17	0	0	—	—	
Hominy Chop	17	15	0	—	—	
Gluten Feed	17	5	0	121 6	2	10½
Maize Cake Meal	17	5	0	—	—	
Compound Cakes—						
Not less than 7 per cent. oil and 20 per cent. protein	17	15	0	About 100	About 3*s*. 6*d*.	
Not less than 6 per cent oil and 20 per cent. protein	17	10	0	About 95	About 3*s*. 8*d*.	
Not less than 6 per cent. oil and 17 per cent. protein	17	7	6	About 90	About 3*s*. 10*d*	
Millers' Offals—						
Fine Grade—Sharps	14	0	0	92 0	3	0½
Medium Grade—Pollards	13	10	0	87 0	3	1¼
Bran	13	0	0	77 5	3	4¼
Broad Bran	14	0	0	79 9	3	6

Cattle for Beef Production.—There is nothing to add to the remarks on this subject made in the last two months' notes.

Sheep.—Nothing further need be added to notes on sheep for the last two months.

Pigs.—Meals suitable for pigs are still scarce and dear, though slightly cheaper at the fixed prices.

Pig-keepers should read the article on "Pig Feeding in War Time," which appeared in last month's issue of this *Journal*, p. 721, and is concluded in this issue, p. 826.

Notes on Manures in December:
From the Rothamsted Experimental Station, Harpenden, Herts.

Value of Lime or Chalk on Heavy Soils.—During the recent wet weather the heavy land at Rothamsted that had been well dressed with chalk allowed the water to drain away far more readily, and was fit for working much sooner, than the parts of the same field that had not received chalk. This is a general experience, and it emphasises the need of applying lime or chalk, or, if neither is available, ground limestone, on heavy land that has been ploughed up for cropping. In present conditions it is impossible to over-estimate the need of fully utilising any chalk or lime that can be obtained.

Lime brings about two kinds of improvements—some which last for a long time, others which are more transient. Semi-permanent improvement is effected when the lime puts out of action some definitely injurious factor such as acidity, disease organisms, etc., and more transient effects are produced where it is used simply to increase the productiveness of the land.

The value of lime in neutralising a harmful factor is well shown at Rothamsted, at Woburn, and at Cockle Park. At Rothamsted, sulphate of ammonia is applied to some of the grass every year in such quantities that the soil has become acid, and, consequently, unsuited to the growth of some of the better grasses and clovers. Lime neutralises this acidity and therefore restores the soil to its normal neutral condition; the effect lasts so long as the soil does not again become acid. So at Woburn a dressing of lime counteracts the acidity, and therefore the sterility, produced by sulphate of ammonia, and the effect persists. At Cockle Park the lime was used to counteract finger-and-toe, and here again it brought about an improvement in crop which lasted for a considerable time.

Lime also effects a semi-permanent improvement on wet, heavy soil as soon as adequate provision is made for drainage, *e.g.*, on the yellowish, greyish or blue clays of the Lias and other formations of the Midlands, and the heavy soils on the Mountain Limestone of the West; wherever, in short, owing to neglect in the past, the drains and ditches have been stopped and the land has consequently become thoroughly sour. This is clearly shown in the herbage in which the following plants predominate—bent, sheep's fescue and sweet vernal grass (the two latter marked with very dark-green patches), sorrel, buttercups, hassocks, etc. The effect of lime is to bring about a marked improvement in the herbage, the clovers increasing considerably and the grasses improving. In all these cases the improvements are permanent in character, until through neglect or bad management the harmful conditions are allowed to set up again.

Where there is no particularly harmful factor to be thrown out of action, the effect of lime is by no means so persistent. Thus lime only produced an effect in the first year on the Rothamsted grass plot manured in the sort of way a good farmer might adopt, *i.e.*, dressed with farmyard manure every fourth year and with something else (fish guano in this case) two years afterwards. It was quite a good effect, increasing the yield of hay from 41 to 63 cwt. per acre, but it only lasted one season. Here the herbage had been quite satisfactory and there was no specially harmful condition in the soil. On the other hand, a plot on the same field that had been rendered acid by excessive use of sulphate of ammonia showed increases for at least four years because the special harmful factor—the acidity—was overcome.

Value of Organic Manures.—Most farmers know the value of organic manures, but there is very little experimental evidence to show which of them is most generally useful. A trial has been conducted for the past 13 years at Rothamsted with Peruvian guano, rape cake and shoddy, on a rotation which included wheat, barley, swedes and mangolds, and the results show that there is really very little to choose between the three on a heavy soil with a rainfall of about 28 in. In the year for which it was applied Peruvian guano has given from 7 per cent. to 82 per cent. increase in crop; rape cake has given from nothing to 85 per cent. increase, and shoddy from 6 per cent. to 73 per cent. increase; the mean for the whole 13 years being 42 per cent. increase for Peruvian guano, and 36 per cent. increase for rape cake and shoddy. The guano left no measurable residue for the second or subsequent years, but both rape cake and shoddy did leave small but appreciable residues. These results emphasise the need for securing any materials of this sort that can be obtained. Among other substances not included in the experiments, but well known to farmers, are slaughter-house wastes, and fish guano. It is highly desirable that corporations owning slaughter-houses should take all possible measures to preserve all the wastes and residues that can be used by the farmer.

Collection of Seaweed where Possible.—It is greatly to be hoped that all possible steps will be taken for the collection and utilisation of seaweed during the coming months. Seaweed is of peculiar value now by reason of its high content of potash, in which constituent it is considerably richer than farmyard manure, as the following figures show :—

Good bullock	manure	contains	15	lb.	potash	(K_2O)	per ton.
,, cow	,,	,,	10	,,	,,	,,	,,
,, horse	,,	,,	12	,,	,,	,,	,,
Fresh seaweed		contains	20–40		,,	,,	,,
Dried	,,	,,	60–230		,,	,,	,,

The method of using seaweed is well known to farmers on the coast and is described in the Board's Leaflet No. 254. In order to obtain the fullest value of the potash the seaweed should be put straight on the land and spread ; it need not be ploughed in at once if it would be more conveniently left till later, but it should not be left in heaps to rot. as during rotting the potash is liberated and may be wasted.

Manuring for Cross Cropping.—In days when corn was cheap the convention became fixed that cross-cropping, or taking two straw crops in succession and out of the rotation, was not a desirable procedure. Some of the best farmers always knew that it could be done, and in a careful series of experiments carried out by the Norfolk Chamber of Agriculture the complete economy and feasibility of growing barley after wheat was demonstrated* on almost any land suitable to wheat, provided, of course, the land was tolerably celan and in good heart. In such cases it is eminently desirable to arrange for a spring dressing of 1 cwt. sulphate of ammonia and 2 or 3 cwt. superphosphate. Provision should be made for these fertilisers as soon as possible to ensure adequate supplies.

Soot.—In view of the great value of soot as a spring dressing for common, heavy land, especially if the winter happens to have been wet, farmers would be well advised to ensure having their spring requirements in sight. With sulphate of ammonia at £16 *7s.* *6d.* per ton, as it will be after 31st December, a reasonable price for soot would be 9*d*. per bush., assuming that soot contains as usual about 4 per cent. of ammonia or 1 lb. of nitrogen per bush. It is only ordinary household soot that comes up to this standard; boiler flue dusts do not, and should only be bought on analysis, if at all.

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*·Norfolk Chamber of Agriculture, Summary of Experiments, 1891, p. 4.

Economy in Milk Production.

MANY farmers will need to effect considerable economies in their methods of dairying if they are to make a reasonable profit during the coming winter in view of the fixing of milk prices. This fact has been already pointed out by the President of the Board of Agriculture (Mr. Prothero), notably in his speech at Darlington on the 5th instant. The Food Production Department has issued an analysis of the position emphasising Mr. Prothero's contention and pointing out directions in which it is believed that the majority of farmers might economise with advantage. Stress is laid by the Department on the fact that in the particular matter of the use of concentrated feeding stuffs, the prospective shortage of supplies renders it imperative, in the national interest, that every dairy farmer should exercise the utmost possible economy. Various factors contributing to the cost of milk production, such as rent, labour, interest on capital, etc., are largely fixed and admit of no reduction. Others, including the important item of feeding stuffs, are essentially under the control of the farmer—largely, if not entirely; they represent the farmer's opportunity to economise.

To how great an extent the total cost of milk production is determined by the cost of feeding comparatively few farmers seem to realise. Forty-three farms were recently the subject of inquiry, and on these the cost of food averaged 70 per cent. of the total cost of milk production, the proportion being substantially the same whether the total cost of production was high or low. The cost of food on the average was almost equally divided between home-grown and purchased foods; that is to say, whilst out of every 10*d*. spent in producing milk 7*d*. represented the cost of food, half of this 7*d*., *viz*., 3½*d*., was paid for purchased feeding stuffs.

It is obvious that the margin of profit in milk production must turn largely upon the care exercised in the use of both home-grown and purchased foods. In the case of the latter, the difficulty of obtaining adequate supplies, together with high prices, must compel many a dairy farmer to give less to his cows than he has usually supplied in the past. On some farms this will necessitate a greater consumption of roots and hay, but it should not be too readily assumed that this is necessary. In pre-war days, when supplies of concentrated foods were plentiful and prices relatively low, it was possible for the dairy farmer to allow a generous margin of safety in his ration in order to ensure a full milk supply.

Under present conditions, however, with supplies very low and prices very high, the extra pound of cake has become a much greater factor in the economy of milk production. Every farmer should determine for himself what is the lowest ration that will maintain the normal yield of his cows whilst keeping them in sufficiently good condition for the purpose for which they are intended. It should be borne in mind that with cake at £18 13*s*. 4*d*. per ton (2*d*. per lb.) every pound of cake saved means a reduction of 2*d*. in the cost of feeding the cow, or in the case of the average cow giving 2 gal. of milk daily, a reduction of 1*d*. per gal. in the cost of production of the milk.

It is well known that even on farms where the general system of dairying is the same, the feeding of the cows varies greatly both in total weight and in cost. As an illustration of this the records of five North Yorkshire dairy farms for the winter of 1913/14 may be quoted. On these farms the cost of feeding (taking home-grown foods at prices then not far removed from their market values) ranged from 10·6*d*. to 15·5*d*. per cow per day. For the coming winter the costs of supplying the same rations are estimated on the same basis to range from 22·4*d*. to 28·9*d*. per day, a significant illustration of the great increase in the cost of feeding.

The economy of the various rations is not determined by their cost alone, however, but by their relation to the amounts of milk obtained, as indicated by the cost of food per gallon of milk. These ranged in the earlier period (1913/14) from 5·1*d*. to 6·9*d*. It is interesting to note that although the former farm showed the highest cost *per cow*, it showed the lowest cost per gallon, owing to the excellent yield of milk obtained. This is in sharp contrast to the other farm where the high cost of feeding was so little warranted by the milk yield secured that this farm showed the highest cost per gallon in the group.

Two directions are thus clearly indicated along which the dairy farmer may profitably seek to effect economies in his costs of production, *viz.* :—

(*a*) *By lowering the quantities and total cost of foods supplied.*

(*b*) *By raising the average milk yield of his herd.*

On these two points the following further considerations may be offered.

There can be no doubt that the rations used on many farms are heavier than is necessary for the maintenance of the existing milk supply. The work of the milk-recording societies established in recent years has already revealed many such cases, of which the following may be quoted as examples :—

(*a*) " One definite case of over-feeding was found and that in the course of the first round of visits ; by the time of the second visit the cost of feeding had been reduced 2*d*. per gal. without any decrease in the yield."—(*University College. Reading, Bull. XIX., p. 12.*)

(*b*) In the second year the allowance of roots was cut down (from 100 lb.) to 44 lb. per day and the cake was reduced by 1 lb. The milk yield remained practically the same and, the cost of feeding being reduced 4¾*d*. per day, the result was that the milk cost 2*d*. per gall. less."—(*South-Eastern Agricultural College, 4th Report, (1915), p. 35.*)

It is not difficult for those versed in modern methods of judging rations to detect when rations are clearly excessive and to indicate roughly to what extent they may be reduced. Such expert guidance is available to every farmer who will take the trouble to communicate with his local agricultural college or with the Board of Agriculture. Even greater assistance could probably be rendered if dairy farmers who have achieved special success in the economical production of milk would make their methods generally known to their colleagues. In any case it is a relatively simple matter for any dairy farmer who will take the trouble to weigh his milk, to test the effect of a reduction in his ration by feeding one half of his herd on the reduced ration and the rest on the normal ration, and comparing the yields of milk in each section before and after the change.

Another direction in which the experts suggest that the farmer might look for substantial results, although less immediate, is the raising of the average milk yield of his herd. This, of course, can be effected only in any substantial degree by the elimination of low-yielding cows and their replacement by others giving a higher yield. In order to effect this purpose safely and satisfactorily, the farmer is reminded that he must note accurately what each cow in his herd is producing ; in other words, he must keep milk records. If he is unable to undertake this work personally he should endeavour to secure the co-operation of his neighbours in the formation of a Milk Record Association which would secure the records for him.

The extent to which the milking capacity of individual cows of the same breed varies may be illustrated by the following summary of records of 275 non-pedigree dairy Shorthorns, with their third calf or older, as ascertained in four years' milk recording (1911—1915) on 13 North Yorkshire milk-selling farms :—

Yield of Milk in 12 months. *Gal.*	*Number of Cows in each Group.* *Actual Number.*	*Per cent. of Totals.*		
Under 400	10	3·6	8·0	19·6
401—500	12	4·4		
501—600	32	11·6		
601—700	60	21·8	60·0	
701—800	58	21·1		
801—900	47	17·1		
901—1,000	28	10·2	20·4	
1,001—1,100	20	7·2		
Over 1,100	8	3·0		
Total No.	275			

The lowest individual yield per annum was 315 gal. and the highest 1,314 gal. In other words, if the milk be valued at 1*s.* 5*d.* per gal., the worst cow produced in the year milk valued at £22 6*s.* 3*d.*, whilst the produce of the best cow was worth £93 1*s.* 6*d.* The last-named figure represents an ideal which few cows are likely to attain ; but it is worth noting in the foregoing table that 10 per cent. of the records exceeded 1,000 gal., whilst a further 10 per cent exceeded 900 gal. The cow giving 900 gal. or more per annum is thus by no means a rarity ; and it is safe to claim that the numbers of even these high-yielding cows might be appreciably increased by shrewd selection and a weeding out on the basis of systematically kept milk records.

Turning to the other end of the scale the table indicates that the average cow—third-calf or older—in the herds in question was giving 600 to 900 gal. per annum, 60 per cent. of the records falling within these limits. These figures suggest that the farmer who is seriously in earnest in the improvement of his herd should not rest content with anything less than 600 gal. per annum for any cow from the third lactation period onward. On the figures shown in the table this would indicate a margin of about 20 per cent. of lower-yielding cows to be replaced. It is clear that the 8 per cent. of cows giving less than 500 gal. should be entirely eliminated, whilst with systematic effort the 11·6 per cent. of cows giving 500 to 600 gal. might be sensibly reduced.

Heifers and second-calf cows have been purposely omitted from the foregoing abstract of the North Yorkshire milk records, since the potentialities of such young animals cannot be gauged by milk yield alone, and their inclusion would have overweighted the numbers of apparently inferior animals. The advantage of systematic milk recording for purposes of grading and weeding out such young stock, however, is too obvious to need specific illustration.

The North Yorkshire data may serve further as a basis for a rough estimate of the probable cost of production of milk on these farms under present conditions. The average estimated cost of feeding (taking home-grown foods at conventional prices) for the 13 farms for the four pre-war years during which the records were obtained was £17 11*s*. 4*d*. per cow per annum, the averages for the individual years showing relatively little variation.

If now we assess the increase in cost of feeding at present at 60 per cent. (winter 100 per cent., summer 20 per cent.) we arrive at the sum of £28 2*s*. 1*d*., or in round figures £28, as the estimated cost of feeding under present conditions. If further we assume that the food costs represent 70.per cent. of the total cost of production of milk we arrive at the figure of £40 *per cow per annum* as the estimated average cost of production of milk on these farms on the lines followed in the past. With milk at 1*s*. 8*d*. per gal. this indicates that in order to cover the bare cost of production of the milk the total annual output of milk must represent an average of 480 gal. (£40 1*s*. 8*d*.) per cow spread over every cow and heifer, in milk or dry, kept in the herd for the period.

The profit of the farmer will be determined therefore by his skill on the one hand in reducing his cost of feeding below, and on the other hand in raising his average milk yield above, the levels indicated in the estimate. The way to the former improvement is by careful rationing of both home-grown and purchased foods and by skilful selection of the latter, whilst the way to the latter improvement is through systematic milk recording.

If further illustration of the possibilities of improvement through the Milk Record Society be desired, attention may be directed to the report of the Live Stock Scheme in the August issue of the *Journal of the Board of Agriculture.* A society whose members owned 464 cows increased its production during its second year of operations by 36,000 gal., although the number of cows was only increased by two.

Potatoes Grown from Single Eyes.

THE following Note on potatoes grown from single eyes appeared in the Bulletin of Miscellaneous Information (Nos. 4 & 5, 1917) recently issued by the Royal Botanic Gardens, Kew :—

The shortage of seed potatoes in the spring of 1917 created a good deal of discussion in the Press as to the advisability of cutting tubers for planting into small sections instead of planting them whole. In order to test certain assertions as to the heavy yield from small scraps of tubers containing single eyes, the following experiment was conducted under conditions available to every allotment holder.

In January, 1 lb. of tubers of Kerr's Pink and 3½ lb. of tubers of Lochar were obtained from Scotland. The Kerr's Pink were very small and were 15 in number. The Lochar were much larger ; the exact number was not kept. All were at once placed in boxes and put in a light room from which frost was just excluded. Little progress in sprouting was made before the beginning of March, so the boxes were placed in a warmer room for a fortnight. The sprouts were by that time ¼ in. long The tubers were then cut into sections with one eye each except in the case of the five largest tubers of Lochar which were left whole. In this way 51 single-eye sections were procured from Kerr's Pink and 80 single-eye sections of Lochar.

The eyes were then placed in boxes of leaf mould and sand and lightly covered. They were stood in a light room in which there was a fire for several hours each day, but the boxes had eventually to be placed in a cold shed to check too rapid growth, the weather being too inclement for planting.

The ground used was part of an old market garden that had been more or less derelict for several years. It was very heavy and dirty and it had to be dug when very wet. In that condition it was too sticky to break up well, and when dry it became very hard and lumpy. Planting could not be undertaken until 20th April, and on account of the poor planting condition of the soil a little fine soil from an old rubbish heap was placed in the trenches with the sets. The rows were planted 28 in. apart and the plants were placed 14 in. apart in the rows, and covered by about 3 in. of soil. The first shoots appeared above ground on 1st May, and from that time the plants grew vigorously. Before earthing up a little guano was sown between the rows, but no other manure was given.

About the middle of July, and again during the second week in August, they were sprayed with Burgundy mixture, but the tops did not show signs of disease. In both cases the haulms were very vigorous.

Lochar was lifted on 15th September, and yielded 197 lb. of tubers. The largest tuber weighed 13½ oz., and there were many between 8 and 10 oz. There were 27 lb. below seed size and 12 small tubers were diseased. Many tubers were affected with scab. Of the five large uncut tubers one was cut into two equal pieces at planting time, the others being planted whole. There was no difference at lifting time between the whole and the half tubers, but they bore heavier crops than the single eyes. The six sets yielded 24 lb. 10 oz. of tubers, but there was a large percentage of very small potatoes, each root numbering over 100 tubers.

Kerr's Pink was lifted on 22nd September, and each root was weighed separately. The total yield was 157 lb., the heaviest root yielding 7 lb. 13 oz. Two other roots yielded 5 lb., and 5 lb. 10 oz., respectively, whilst other 10 roots produced 4 lb. or more each. Sixteen roots bore between 3 and 4 lb. each and but two roots yielded below 1 lb. each. Those two roots were always rather weak and the tops were eventually killed by their stronger neighbours. They produced but 6 and 7 oz. respectively. The heaviest tuber weighed 15½ oz. and there were many tubers between 9 and 13 oz. Seven pounds were below seed size. Seventeen tubers were affected with ordinary potato disease, and many were marked with common scab in the same way as all the varieties of potatoes grown on the same ground.

More room ought to have been allowed both between the rows and the sets, for the tops became very crowded by the end of July.

Farm Tractors.

THE number of tractors placed by the Food Production Department at the disposal of the farmers of England and Wales now approaches 2,000; and the demands from the counties for more tractors very largely exceed the supplies. This is strong evidence of the contention recently put forward that "the tractor justified itself." Of course, it is not contended that every tractor supplied has been satisfactory; far from it. But it is contended, and the contention is supported by a great and growing volume of evidence, that where the tractors are being properly used and adequately supervised they are progressively successful.

It may be impossible entirely to guard against bad weather, unavoidable shortage of spare parts, and various other causes, but doubtless in the past much of the indifferent work done by tractors has been due to an unwise selection of the land on which they were put to work, slack control, or want of skill on the part of the men entrusted with them.

Nothing is to be gained by vague general aspersions on the tractor as a farm implement; it has come to stay because, given fair and proper conditions, it does good work at a reasonable cost. It is essential to the achievement of the National Agricultural Programme.

Despite depressing weather conditions the tractor figures for a number of counties continue to form encouraging reading, although wherever there has been heavy, continuous rain it has left its mark on the averages. In Shropshire, notwithstanding stoppages through bad weather and repairs, one tractor did 19½ acres in 46 hours, another 19 acres in 45½ hours; a third 18 acres in 41 hours; and a fourth 15½ acres in 47 hours; whilst 2 did 12 acres in 29 and 30 hours respectively.

The Food Production Department's Commissioner for the Cambridge and Isle of Ely area reports that in the Fens a light tractor driven by a woman has been doing 5 or 6 acres of ploughing daily. The Commissioner lays stress on the fact that only the very lightest of tractors is suitable for winter work on fen land. The average during last week for the tractors in this area was poor, owing mainly to the sodden state of the ground. The Essex Commissioner, by the way, emphasises the point that only the lighter type of wheel tractor, it is locally believed, can tackle the heavier Essex lands satisfactorily when they are wet. In Middlesex last week the average was above the nine-acres minimum stated to be "payable" by adverse critics—10 tractors did 119 acres. During most of the week ending 12th October the Gloucester tractors had a slow time, owing to the rain. Work was impossible on the low-lying lands. However, some of the tractors were threshing very satisfactorily. The best figure from Cheshire was 16 acres of stubble ploughed by one of the tractors

The Staffordshire tractors in two districts averaged 14 and 13½ acres per tractor—one acre of ploughing being reckoned as equal to 2½ acres cultivated. This was in the week ending 18th October—described as "a wretchedly wet week." One tractor cultivated 50 acres, although standing 1½ days through wet, and a journey; another ploughed 13½ acres although standing one day; and a third ploughed 11 acres although standing 2½ days. Other figures for Staffordshire tractors are 11½ acres ploughed, standing one day; 12½ acres ploughed; 21 acres cultivated, and 5 acres ploughed, standing one day; 56 acres cultivated; and 36 acres cultivated. One tractor did the supposed payable minimum, 9 acres, although standing three days; and 21 tractors ploughed 152 acres and cultivated 239½ acres in the very broken week.

In the Holland Division of Lincolnshire 215 acres were ploughed in 5 days by 18 tractors; 151 acres by 10 others. One tractor ploughed 26½ acres in the week. In the Lindsey Division (where the Commissioner reports that the new tractor scheme is greatly improving the output of work) 29 tractors in bad weather ploughed an average of 12½ acres per tractor.

The average per tractor during the week ending 12th October in the North Riding of Yorkshire was 11·56 acres; 273½ acres of arable and 7½ acres of grass being ploughed and 66 cultivated.

The Hants and Dorset report mentions that 30 tractors ploughed 331½ acres in Hants during the week, although 3 days were lost on each tractor owing to the bad weather. In the same week 25 tractors in Dorset ploughed 229¾ acres.

From Oxfordshire, South Wales and elsewhere come very cheering accounts of the progress made by soldiers who have been instructed in tractor work recently. In Oxfordshire the Sub-Commissioner, who has been inspecting the district, says he has been very much struck by the great adaptability for tractor work of the "unskilled" soldier labour now being used with the machines. A South Wales report speaks most highly of the anxiety of the soldiers to learn tractor work, and the handiness generally displayed by the men.

Recent Agricultural Legislation in the United States.

AN Agricultural Act providing for the national security and defence, by stimulating agriculture and facilitating the distribution of agricultural products, was approved by Congress on 10th August, 1917. The Act authorises the Secretary of Agriculture, with the approval of the President, to ascertain all facts relating to the supply, consumption, cost and prices, manufacture and distribution of all food materials, seeds, fertilisers, agricultural implements and machinery, and requires that any person interrogated by the Secretary or by one of his agents, on any matter relating thereto, shall within 30 days furnish to the best of his ability the information required, by producing all relevant books and documents in his possession, under penalty of a fine not exceeding $1,000 or one year's imprisonment.

The Act further authorises the Secretary of Agriculture, in case of any special need for seeds suitable for the production of food or feed crops, to purchase or contract with persons to grow such seeds, to store them, and to furnish them to farmers for cash, at cost, including the expense of packing and transportation. The President is authorised to direct any agency or organisation of the Government to co-operate with the Secretary of Agriculture in carrying out the purposes of this Act and to co-ordinate their activities so as to avoid any preventable loss or duplication of work. Further, for the purposes of the Act, until June, 1918, the following sums of money have been appropriated :—

For the prevention, control and eradication of the diseases and pests of live stock, enlargement of live-stock production, and the conservation and utilisation of poultry, dairy, and other animal products, $885,000.

For procuring, storing and furnishing seeds, $2,500,000.

For the prevention, control and eradication of insects and plant diseases injurious to agriculture, and the conservation and utilisation of plant products, $441,000.

For increasing food-production and eliminating waste and promoting conservation of food by educational and demonstrational methods, through county, district, and urban agents and others, $4,348,400.

For gathering authoritative information in connection with the demand for, and the production, supply, distribution, and utilisation of food, extending and enlarging the market news service, and preventing waste of food in storage, in transit, or held for sale, advice concerning the market movement or distribution of perishable products, for enabling the Secretary of Agriculture to investigate and certify to shippers the conditions as to the soundness of fruit, vegetables, and other food products, when received at such important central markets as the Secretary for Agriculture may from time to time designate, and under such rules and regulations as he may prescribe: *Provided*, That certificates issued by the authorised agents of the Department shall be received in all courts as *primâ facie* evidence of the truth of the statements therein contained; and *Provided further*, That the Secretary of Agriculture shall, so far as practicable, engage the services of women for the work herein provided for, $2,522,000.

For miscellaneous items, including the salaries of Assistant Secretaries appointed under this Act; special work in crop estimating; aiding agencies in the various States in supplying farm labour; enlarging the informational work of the Department of Agriculture, and printing and distributing emergency leaflets, posters, and other publications requiring quick issue or large editions, $650,000.

Testing Women Farm Workers.

THE Food Production Department's report on the recent Test Meeting of Midland Counties Women Farm Workers is of great interest and some significance; and its chief points make instructive reading. It will be recalled that candidates were divided into three classes, according to the length of time they had been employed on the land, viz.:—Class I., Twelve months and over; Class II., Six months and over; and Class III., Three months and over.

It is an interesting fact that in most cases the women who had been employed three months averaged quite as good marks in the tests they entered for as those in Classes I. and II. The tests were arranged to examine the women in certain types of work, upon which they would probably be employed if engaged as whole-time workers on a farm, such as field work; milking and field work; carting and driving and field work; and waggoner's work. Tractor ploughing and threshing were extras and allowed to be taken individually, or in addition to any of the tests.

It was felt that this arrangement of the tests might in many cases prevent the village workers (who are the backbone of the country-side) from entering. It was therefore decided to have a "Special Class," into which would be put those entering only for the additional subjects, viz., thatching or motor-tractor ploughing, and the village women who would be allowed to enter for any individual test and not have to enter for a group of tests, as those entering in Classes I., II., and III. had to do.

The Committee were reproached before the meeting with having set too difficult a task, but the results have proved that it was not so. In nine out of the fourteen tests one or more candidates obtained full marks, and 75 per cent. of the candidates have gained certificates.

The date of the tests (4th October, quite the wettest day of this very wet year) was prejudicial to all outside work. So bad was it after the luncheon interval that all who started their tests at 2 o'clock had to be sent to shelter. Also, the candidates who had to take their milking test at 3 p.m. were unable to complete the tests which had been thus delayed. In all the circumstances the results were astonishingly good; and all the farmers present expressed both pleasure and surprise at the work done. Here are a few of the details :—

Pulling, Cleaning and Piling Roots.—Of the 107 candidates who entered only one failed to gain 75 per cent. marks; there were several who gained full marks. Specially notable in this test were the gang of business girls from Stratford-on-Avon, who since May, 1916, have given up their weekly half-holiday to work in the fields—2 gained full marks, 3 over 90 and the sixth over 80. (On the Saturday following the test these 6 women pulled an acre of mangolds.)

Hoeing and Singling Roots.—Out of 81 candidates who entered, 41 failed to qualify, *i.e.*, obtain 75 per cent. of the marks. As a possible explanation of this a letter received since the test from one of the judges may be quoted. "The climatic conditions made this test extremely difficult, if not almost impracticable," he says. "There were a considerable number who had never hoed turnips on the flat before. The method used in hoeing on ridge, upon which many of them appeared to have a very practical idea, does not, as a rule, include much attention to the ground between the rows, for which a number of marks were allotted." Another judge remarked that it was extremely difficult to allocate the marks fairly.

Trussing.—Twelve candidates entered; 8 qualified and 4 obtained over half marks.

Thatching.—Nineteen candidates entered. 13 qualified, 3 obtained 70 marks and 3 failed. Only 2 candidates attempted to prepare the rick.

Loading and Unloading.—Seventy-three candidates entered. Only one failed to qualify and several obtained full marks.

Mowing by Hand.—Thirty-three candidates entered; 17 qualified, 1 obtained between 70 and 74 marks, and 13 failed.

Grooming, Harnessing and Driving.—Thirty entered, 8 qualified, 14 obtained full marks in all points except backing. This they could not do owing to the state of the ground. Eight failed—their marks probably were considerably lower than they would have been had they been able to obtain marks for backing.

Ploughing.—Twelve entered, 4 qualified, 6 obtained 70 marks, and 2 failed.

Ridging.—Eight entered, 6 qualified, and 2 failed.

Drilling.—Eight entered, 7 qualified, and 1 failed.

Milking by Hand.—One-hundred and eighteen entered and only 4 failed to qualify; 2 obtained full marks. (Many of the cows milked are usually milked by machinery.)

Milking by Machinery.—Four entered and all qualified.

Motor-tractor Driving.—Three entered, but one only drove the tractor. All qualified. One gained 100 marks for manipulating the plough and 90 for driving the tractor. One candidate took the test on a tractor of a make that she was not accustomed to drive.

There were 34 judges, drawn from the contributing counties of Worcester, Leicester, Warwickshire, Greater Birmingham, Shropshire, Oxfordshire, Notts, Gloucester, Staffs, Northants, Derby and Hereford.

The West Bridgford Allotment-Holders' Association.

THE following note on the West Bridgford Allotment-Holders' Association has been communicated to the Board by Mr. R. C. S. Ross, F.R.H.S. :—

Both from its individual and co-operative aspects, the West Bridgford war plot movement has been so successful that a short account of the progress made since its inception should prove helpful to other similar bodies.

The district is a large residential suburb of Nottingham, with a population at the last census of 11,722, and a total area of 1,116 acres ; it is laid out practically as a garden city, and this fact, owing to the open planning and surroundings, considerably aided the successful cultivation of various idle building sites. Situated in the Trent Valley (85 ft. above sea-level), the soil is in the main gravel on a clay sub-soil, producing farm crops of wheat, barley, oats and roots. Some localised modifications of the soil have, naturally, been caused by building operations.

History of the Association.—In the early winter of 1916–17, a number of enterprising residents obtained odd pieces of land by private treaty with the owners, but the general growing demand in the first months of the present year induced the Urban District Council to take action by renting several large building sites for sub-letting as required. Under the existing powers the remaining vacant plots were taken to keep pace with the demand. In this way about 270 plots have been supplied to applicants (it is difficult to ascertain the exact number). The allotments vary from 10 to 15 rods, and give a total area newly under cultivation of some 38 acres.

The war gardeners form an extremely satisfactory percentage of the population, and, in addition, practically every house has not less than 100 sq. yd. of garden, generally with one or two fruit trees. A large number of pre-war allotments are an added source of food production.

The " War Association " was formed in March of the present year, and affiliated in July with the Royal Horticultural Society. By 13th September the membership had risen to 164.

Work of the Association.—Before the control of war allotments was in the hands of the Association, the Urban District Council had fenced most of the plots, and a general charge of 2*s*. 6*d*. for 100 sq. yd. to meet all expenses was levied as "rent." This is a final charge, and not an annual one, reduced from 3*s*. 4*d*. after repeated representations to the Council.

Show of Vegetables.—In addition to the usual activities of such societies, the Association organised a successful war-plot show of vegetables, most of which were handed over to the local V.A.D. hospital for the wounded. No encouragement was given to freak growing, and the exhibits were splendid all-round produce. The allotment competition produced keen rivalry, to the great benefit of the gardens.

Fruit Bottling and Canning.—Seven open demonstrations in fruit bottling and two in vegetable and fruit canning have been given without any public charge The aid of the Food Production Department and the Notts Education Committee was secured, and, following the demonstrations, 400 doz. bottles and 7 gross of 2-lb. and 3-lb. cans have been disposed of in the district. The canning was done free by Association members, the Committee having obtained the loan of a " home canner " from the Countess of Carnarvon.

Surplus Fruit.—A great quantity of surplus fruit, Victoria plums, damsons, apples and pears, obtained in surrounding villages, has been distributed at cost price—sometimes at one-fourth the shop rates—among members and the general public. Several tons of fruit were thus saved from rotting on the trees, but the great difficulty of finding a depot prevented a greater turnover. Outside assistance could not be reckoned upon, but, on the contrary, opposition from certain shopkeepers and greengrocers restricted the work.

Potato Spraying.—Potato spraying, at a covering charge for the chemicals used, was performed by the Association, but advantage was not taken of this as it might have been, though the spraying campaign was conducted vigorously. On the whole an increased yield was obtained from the treated crops, but exact details are not yet to hand.

Two tons of seed potatoes—King Edward and Arran Chief—were bought by the Council in March, and divided among the allotment workers at cost price. The seed was of very mixed quality, the lateness of the plot movement and the consequent difficulty of getting any seed at all contributing to this and militating against the thorough success of the results.

Educational.—Many of the cultivators—the majority of whom are business men—were novices in the craft of allotment gardening, and the aim of the Association has been to supply a basis of sound horticultural principles for its members to work upon. Monthly lectures have been given, including such subjects as soil and its working, manuring, inter- and continuous cropping, rotation, and garden pests, while one of the R.H.S. Panel members is always open to visit plots and give advice. The leaflets of the Board of Agriculture have been circulated with very great advantage.

Expenses.—The annual subscription is 1*s*.

Receipts.		*Expenditure.*	
Subscriptions, sale of rules, show profits, etc. ..	£13 9 6	Postage, printing, affiliation fee, etc.	£8 17 4

Showing a balance in hand of £4 12*s*. 2*d*.

Results.—The produce has been well varied, and on the whole excellent in quality and quantity. By a rule of tenancy 60 per cent. of the ground was cropped with potatoes.

A great deal of the success is undoubtedly due to the incentive to sustained effort provided by the Association.

The Future.—The winter programme includes 9 lectures, covering the whole subject of vegetable growing in allotments; the organisation of a boy's section on the lines of a school garden; the co-operative purchase of seed, sprays, manures, and garden requisites; and the organisation of a scheme for the disposal and preservation of surplus produce.

Every endeavour will be made to place the allotments on a permanent footing, and it is likely that the membership will be opened to all garden cultivators in West Bridgford.

THE LEAGUE OF NATIONAL SAFETY.

SIR ARTHUR YAPP, K.B.E.

Ministry of Food.

IN these days one needs to apologise for bringing into existence another League or Society. But the excuse is not hard to find. We are up against an exceedingly serious situation as far as our food supply is concerned, and the initial difficulty I find in my campaign is that one section of the community suggests that it is all bluff, and there is no need to economise, whilst another section takes the line —" If the position is as serious as you say, why does not the Government ration us at once ? "

It is not by any means an easy thing to bring into existence a great compulsory system of rationing in which all our principal foodstuffs would be involved. It would take a long time to perfect the necessary machinery, and even in a highly-organised country like Germany the difficulties encountered were enormous. It is stated authoritatively that during the first year of war six million tickets were forged in Germany. Apart from that the moral effect will be enormous amongst our own people, amongst our Allies, neutrals, and even in enemy countries, if, in response to the call for food economy now being made, the nation responds in the manner we anticipate they will.

The League of National Safety may save us from the expense and inconvenience of compulsory rationing, but if rationing by tickets ultimately proves inevitable, it will pave the way for the effective working of the scheme more than possibly any other organisation could do. Even under compulsion we should depend to a very large extent on the goodwill of the nation.

The badge of the League will be the Anchor, and it is hoped that within a few weeks this emblem will become as well known as the Red Cross or the Red Triangle. The membership of the League is open to all over sixteen years of age, and this is the declaration signed by each member :—

> " Please enrol my name in the League of National Safety. I realise that economy in the use of all food and the checking of all waste helps my country to complete victory, and I promise to do all in my power to assist this Campaign for National Safety."

The League was formally launched at Keighley on Saturday, 3rd November, when I asked for 10,000 members during the week-end to be the immediate nucleus of the scheme. By the following Monday evening 12,700 applications had been received, and by four o'clock the following afternoon the number had risen to 23,766. I ask now for 1,000,000 before the end of the month and for 10,000,000 by Christmas, and so on until the whole nation is organised for Food Victory.

Every member of the League will be pledged to save food, not merely by eating less in accordance with the new scheme of rationing, but, and this is just as important, by the prevention of all waste. The War will be won on the battlefield and in the kitchen and in the dustbin, if one might use that expression. By the dustbin I mean every kind of place where waste accumulates, private houses, munition factories, or on farms. At the same time I would point out that a large proportion of the national waste occurs before the dustbin is reached, through unskilled cooking.

It was stated in the last official submarine* return that 14 ships over and 4 under 1,600 tons were sunk during the previous week. If one only contained wheat, say 6,000 tons, that would mean 5,376,000 half-quartern loaves of 2 lb. each, the loss of one week's bread ration for 2,688,000, or, for the whole of Keighley, supplies for fifteen months.

The start of the League has been encouraging in every way. All sections of the community have pledged their help—the Churches, the Press, Co-operative Societies, Trades' Unions, Womens' Unions, Labour Leaders, and so on. I make now a very strong appeal to the agricultural world in particular—the actual producers of food, land workers, farmers, and labourers alike, to pledge their unflinching support. Only thus shall we win through. We have to put our hands to the plough, and there must be no turning back.

Probably the worst thing that could happen at the present juncture would be an inconclusive peace. It would mean that we should have the whole thing to fight over again. It would mean, moreover, financial ruin, another mad race in armaments and universal militarism, or else we should degenerate into a vassal state.

Victory is well within our grasp, but it means a tremendous effort on the part of everyone. The men of the Navy and the Mercantile Marine will do their bit. The Army is doing magnificently, and the great call to every civilian is the call to self-denial and self-sacrifice, and, whatever we do is as nothing compared with what others are doing day by day for us.

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* *i.e.* The last before this article was written.

The immediate call to every reader of this *Journal* is to link up with the League of National Safety.

An Anchor League is being formed for boys and girls under sixteen.

Write for enrolment cards to The League of National Safety, Ministry of Food, Grosvenor House, London, W. 1.

OFFICIAL NOTICES AND CIRCULARS.

Ploughing of Grass and Cultivation of the Land.

THE following Circular Letter, dated 10th October, 1917, has been addressed by the Food Production Department of the Board to the Surveyors Institution, the Auctioneers' and Estate Agents Institute, the Central Association of Tenant Right Valuers and the Land Agents Society :—

SIR,—In the course of the campaign for increasing the food supply of the country in the harvest of 1918, Orders are, as your Society is aware, being issued by the County Agricultural Executive Committees for the ploughing up of grass land and generally for the cultivation of land in accordance with the requirements of the Committee. The President of the Board of Agriculture and Fisheries understands that some misapprehension prevails as to the effect of these Orders, and that in certain parts of the country land agents and surveyors have advised farmers that they should not comply with the notices served on them by the Committees, on the ground that such compliance would render them liable to penalties for breach of covenants in their tenancy agreements.

The power to serve such notices is conferred by paragraph 1 (*e*) of Regulation 2M of the Defence of the Realm Regulations by which the Board are empowered by notice served on the occupier of any land requiring him to cultivate the land in accordance with such requirements as the Board may think necessary or desirable for maintaining the food-supply of the country and may prescribe in the notice ; and, under the authority of this Regulation, the Board have delegated to County Executive Committees the power (among others) of serving such notices, by the Cultivation of Lands Order, 1917, No. 3, of which I am to enclose a copy.

It is essential that in the present necessity for increasing the supply of home-grown food, a portion of the permanent grass land should be broken up ; the Committees have been instructed to select with the greatest care the land that is to be so broken, and to bear in mind, on the one hand, the exigencies of the milk supply, and, on the other, the suitableness of the land for cultivation. But, in any event, it is unfortunately impossible to secure the required area under food crops without insisting upon the cultivation of lands which the agreement of tenancy requires to be kept as meadow or pasture. Inevitably, therefore, the notices above referred to must in many cases prevent the farmer from carrying out some of the covenants of his agreement. Section 2 of the Courts (Emergency Powers) Act, 1917 (of which a copy is attached), provides for cases in which an Order made under the Defence of the Realm Regulations prevents a person from doing what is enjoined by his contract of tenancy, or compels him to do what is prohibited by that contract or what would involve him in some liability if not done in compliance with the Order. That provision saves him from liability to damages or any other penalty for failure to comply with any covenant which he is thus prevented from fulfilling. Consequently, the compliance of a farmer with a notice to plough up grass land will not expose him to any penalty for breach of the agreement and cannot be taken into account against him in an outgoing valuation. The same observation applies to a notice which directs the growing of corn after corn or any other manner of cross-cropping.

The provisions of the Courts (Emergency Powers) Act, 1917, have perhaps not yet become generally known, and Mr. Prothero will be greatly obliged if, with the permission of your Society, they can be brought to the notice of its members, together with the contents of this letter. Any negligent or wilful failure to comply with a notice issued under paragraph 1 (*e*) of Regulation 2M will expose the offender to the penalties of a summary offence against the Defence of the Realm Regulations, namely, fine up to £100 or imprisonment for six months with or without hard labour, or both. In a few cases, it has been found necessary to institute such proceedings, and convictions have resulted. But cases of non-compliance have been very rare; and Mr. Prothero earnestly hopes that the programme of increased cultivation of 1918 may be carried out without recourse to stringent measures of this kind, but with the cordial co-operation of all concerned and in the single-minded purpose of securing the welfare of the nation in its present grave emergency.

Reports have also been received that in isolated cases, owners of land or their representatives have threatened to give notices to quit to farmers who comply with the orders of the Executive Committees. It is scarcely necessary to point out how unfair such a threat is to the farmer, who is thus menaced on the one hand by the penalties of the law if he fails to comply, and by the loss of his holding if he does comply. Not only does such action inflict an intolerable hardship on the individual farmer and prevent him from making his due addition to the food supply of the country, but it is calculated to paralyse the efforts of farmers generally and thus to place in jeopardy the whole object of increased cultivation. It would seem to be a good ground for a claim for unreasonable disturbance under Section 11 of the Agricultural Holdings Act, 1908.

The matter of compensation may be referred to in order that landlords and their agents may be completely informed as to their position in respect of notices issued under Regulation 2M. Where such a notice is served upon the occupier of land, and the owner sustains any direct and substantial loss or damage through the occupier's compliance with the notice, he may apply for compensation to the Defence of the Realm (Losses) Royal Commission. In many cases it is at the present moment impossible to arrive at a satisfactory estimate of the effect on the value of the land of its conversion into arable, and the Commission have signified their willingness in such cases to receive the application, and to postpone their hearing of the claim, reserving all his rights to the applicant and giving him liberty to apply at the appropriate time for his claim to be determined. In this way, all applications made for compensation due to this cause will be kept on record, ready to be dealt with whenever the amount of the loss and damage (if any) can be definitely ascertained. The above remarks apply where the land is in the owner's hand as well as where it is let to a tenant.

The Right Honourable Laurence Hardy, M.P., has recently been appointed an additional member of the Commission, as a representative of the agricultural interest.

The misapprehension as to the legal effect of the notices to cultivate in accordance with the requirements of the Executive Committees, and the attitude of those landlords who threaten to determine tenancies if the notices are complied with, constitute obstacles in the way of increased food production which it is highly important to remove. Mr. Prothero feels confident that he had only to invite the attention of your Society in order to secure their co-operation in placing these matters in their true light before their members and before those whose interests are concerned. By so doing, they will be rendering a most valuable service to the nation.

I am, etc.,
(Signed) F. L. C. FLOUD.

THE following Circular Letter, dated 23rd October, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees :—

Claims for Compensation.

SIR,—1. In the Circular F.P. 43, dated 1st May, 1917, Agricultural Executive Committees were informed that applications for compensation in respect of direct and substantial loss or damage sustained by reason of the exercise of powers under Regulation 2M will be submitted in the first instance by the applicants to the Committees. In Paragraph 2 they were asked to instruct a qualified surveyor or land agent to furnish them with a report which, in addition to any general remarks, should deal specifically with each item of the claim. Certain cases have recently been submitted to the Defence of the Realm (Losses) Royal Commission in order that they should be treated as test cases and afford some guide to the general principles according to which the Commission propose to act, in connection particularly with land of which possession has been taken under Paragraph 1 (*a*) of Regulation 2M. The Commission have, however, found that not only the claims themselves, but also the reports of the surveyors which have been furnished by Executive Committees are not sufficiently specific for the purposes of the Commission, and they have indicated certain definite matters on which they will require to be informed in addition to receiving detailed answers to the items of the claim, The instructions given below are in accordance with the requirements of the Commission.

2. *Tenant Right, etc., Valuations.*—It is observed that in certain cases where the claim is made by a dispossessed tenant or owner-occupier, and is of the nature of a claim for loss of tenant right, tillages, value of live and dead stock, and so on, the claim made by the applicant corresponds exactly with the report of the surveyor employed by the Executive Committee ; and it would appear that in these cases the same surveyor has acted for both parties, as not infrequently occurs where similar questions arise between landlord and tenant or between incoming and outgoing tenant. The present questions, however,

arise between the Crown which gives compensation as an act of grace for loss sustained by interference with the property or business of a subject under the Defence of the Realm Regulations, and the subject whose property or business has been interfered with. Consequently, it is necessary for the Commission to be provided with a definite claim made by the subject and a definite answer to that claim made by an independent surveyor acting on behalf of the Executive Committee representing the Government. The applicant should therefore formulate his claim in the first instance (employing, if he thinks fit, the advice of a surveyor or valuer) specifying each item claimed, and attaching a price to each. The claim should then be sent to the Executive Committee, who should appoint a surveyor to examine and report upon the claim. It is not suggested that the surveyor appointed by the Executive Committee should necessarily challenge each item of the claim; but he should consider each item and record his opinion as to whether it should be accepted, and if not, whether it should be rejected altogether or whether some smaller amount is in his opinion correct. In every case reasons should be given. Each item in any report of the Executive Committee's surveyor should be priced. The most convenient form in which such a report can be represented is that of a statement in parallel columns, showing on the left side each item of the claim, and on the right the opinion of the Committee's surveyor on that item, together with the amounts considered proper by him and his reasons for his opinion. A specimen form is being printed for guidance, copies of which will be sent to you in a few days.

3. *Claims for Loss of Occupation Value, etc.*—In addition to claims similar to tenant-right valuations, the owner or tenant frequently claims compensation for loss of rent, loss of occupation, loss of profit or loss due to compulsory disturbance; any item so claimed should be treated in the same way as items of the kind referred to in Paragraph 2, the surveyor recording his reasons why he considers that the item should or should not be allowed, and, if he thinks that it should be allowed, the amount allowable.

4. Where the applicant makes a claim for a tenant-right valuation and states that he proposes to make a further claim for loss of occupation or any other matter, the application should be returned to him with a suggestion that he should apply in a single application in respect of all the items for which he proposes to claim in order that the Commission may have the whole case before them at one time. It will be remembered that in Paragraph 6 of the Circular F.P. 43, it was pointed out that the Commission do not object to sanctioning periodical payments, and consequently the making of such a claim at the present time will not prejudice the applicant in continuing to obtain any compensation that may be awarded to him for loss of occupation value and so on, up to the time when the Committee withdraw from

5. *Tenant Liable for Rent.*—The act of taking possession does not put an end to the agreement of tenancy; and the tenant remains liable to pay rent unless and until the tenancy is determined. It is understood that where land is in the hands of a tenant at the taking of possession by the Committee and the contract of tenancy has not been determined, the Commission do not admit a claim by the landlord for loss of rent, but are willing to decide whether compensation is due

to the tenant in respect of his having had to pay rent for land which the possession of the Committee has not permitted him to enjoy; consequently, in such cases, it should be suggested to the tenant that he should apply for compensation on this account, and the landlord, if he desires to make application to the Commission in respect of rent, should be informed of the view taken by the Commission as above indicated. If he insists on his application being forwarded, this should be done.

6. *Dilapidations.*—Land of which possession has been taken is, as a rule, in such a state that a claim would lie by the landlord against the tenant for dilapidations as regards the cultivation, and also as regards the farm-house, buildings, hedges, and ditches. In reporting upon such a case the surveyor employed by the Executive Committee should include in his report a schedule of dilapidations, giving the price of each item, and a copy of this schedule should be furnished to the applicant in order that he may be prepared to place his contentions upon it before the Commission. A copy should also be furnished to this Department together with the remainder of the surveyor's report. The same remarks on this point apply where the land was in the occupation of the owner at the time of taking possession as where it was in the occupation of a tenant. In either case the Department propose to contend before the Commission that the claim to compensation should be diminished by the amount required to put the land again into a proper state of cultivation.

7. *Particulars Required.*—In forwarding applications to this Department for the consideration of the Royal Commission, the following particulars should be given in addition to the specific answers to the items of the claim and to the schedules of dilapidations above referred to:—

(*a*) The area of the holding in question.

(*b*) Where the entire holding has been taken, this should be stated, where only a part has been taken, the area of that part should be stated together with the area of the entire holding.

(*c*) The area of grass land and the area of arable upon the holding should be stated as at the date of taking possession; where only a part of the holding has been taken, the areas of grass-land and arable on that part should be stated.

(*d*) The date of taking possession.

(*e*) The rateable value of the holding should be stated, and if the land taken is part of the holding, and is separately rated, the rateable value of that part should be stated.

(*f*) Where the land was in the occupation of a tenant at the time of taking possession the rent paid should be stated. Where the land was in the hands of the owner the true rental value in the opinion of the Committee's surveyor should be stated. In addition, where the land was in the hands of a tenant, and only part of the holding is taken, the true rental value of the land taken should be stated.

(*g*) In each case in which there is a tenancy agreement or lease, a copy should be furnished.

8. *Applicant's Title.*—In every case, care should be taken to see that the applicant is the person entitled to such compensation as may be awarded. Where the applicant is applying on behalf of another

person, either as agent, or as relative, some written authority from the person who is entitled to make the application, should be produced.

9. *Claims on Breaking up of Grass Land.*—The above observations deal, in the first instance, with cases in which possession of land has been taken; any claims for compensation on other accounts should be treated as nearly as possible in a similar manner. In the case of claims for compensation on account of orders made under Paragraph 1 (*e*) for the breaking up of grass land, the Commission have expressed the view that the amount of any direct and substantial loss or damage that may have been sustained by reason of such interference cannot as a rule be estimated at the present time with any degree of precision, and they accordingly propose in ordinary cases to adjourn the hearing of any applications on this account that may come before them, with liberty to the applicant to apply for a determination of his claim at any time when this amount is ascertainable. The making of such applications should not, however, be postponed. They should be made upon the service of the Cultivation Order, and if no amount can be specified this should be stated, Such claims when received by an Executive Committee should be forwarded to this Department with a specific answer to each item of the claim, and with a copy of the record of the state of the grass land which has been made on behalf of the Committee before the breaking up. The applicant should be asked whether he is content that his applications should be forwarded to the Commission for record—in which case he will be at liberty to apply as above indicated; or whether he desires a hearing before the Commission at the present time.

I am, etc.,
F. L. C. FLOUD.

THE following Circular Letter, dated 5th November, 1917, has been addressed by the Food Production Department of the Board to County Agricultural Executive Committees:—

The Programme for the Harvest of 1918.

SIR,—1. Our Circular Letters of the 15th May and 14th June last informed Executive Committees how much each should contribute to that increased supply of home-grown food which the Government considers necessary for national security. During the last five months committees have been endeavouring by a careful survey of their counties to ascertain to what extent the increased corn area allotted to them can be obtained, and to schedule the grass land which is suitable for tillage. We are deeply grateful to the members of the County and District Committees and their officials for the time, skill and care which they have given to this public work, and to the great majority of land-owners and farmers for their patriotic response to our appeals. The recent speech of the Prime Minister, with its generous recognition of the farmers' efforts, proves the importance which the Government attach to the campaign for increased food production.

2. If we are to secure food for the people of this country greater and more prolonged efforts are required. A new danger has slowly risen into prominence, and, unless it is arrested, it may develop with fatal

rapidity. Under the pressure of war, Europe is fast declining in productive power. In other countries on which we rely for food, man-power is too reduced to enable them to increase production so as to make good the deficiency. Whether the submarine menace is overcome or not, whether peace is won or war prolonged, makes little difference. We are threatened with a shortage of food throughout the world, and not in 1918 only, but in 1919 and 1920. We can no longer expect to obtain from abroad the quantities of bread and meat by which we have been accustomed to sustain life at home. If we do not feed ourselves no other country can or will. To what extent we shall be short of food depends on the extent of our success or failure in increasing our home-grown supplies.

3. The danger of shortage extends beyond the period of war. In some respects it may be greatest after peace is proclaimed. This grave situation therefore insists that we should recast the rules of good husbandry as understood by ourselves and practised by our forefathers during the nineteenth century. In that period the farmer learned that what was required of him was quality. Now, however, we are forced to consider quantity. Regarded from this standpoint and from the national point of view, grass land, even good grass land, is relatively of much less value than tillage land. An acre under wheat may yield ten times as much human food as an acre of a good fattening pasture, and, on the average of the whole country, it is estimated that tillage land is producing at least four times as much human food per acre as the land under grass.

4. It is essential, therefore, that the policy of breaking up grass land should be pressed and extended. For the harvest of 1918 2,400,000 acres of permanent and additional temporary grass should be broken between now and the end of April next Added to the extra area of stubbles that must be ploughed this year, this appears to be a heavy task. It is not, however, impossible when distributed among the farmers of the country. In the ordinary course farmers in England and Wales plough about 8,000,000 acres in a season, and the additional task would be accomplished if for every four acres ordinarily ploughed they will undertake one acre more. Further, it is certain that out of the 18,500,000 acres of temporary and permanent grass in the country 2,400,000 acres can be found suitable for arable cultivation, if sufficient energy and goodwill is displayed by committees, landowners and farmers.

5. Some committees have contended that it would be sounder policy to concentrate all the available supply of labour and machinery on the existing arable land, because of its foul condition. But it must be borne in mind that the object is to increase to the maximum the production of food at the harvests of 1918, 1919 and 1920. Even if all possible efforts were made, as we hope they will be made, to clean the arable land, the maximum production of food would not be obtained. The acreage now under the plough is in many cases exhausted. On the other hand, newly-ploughed grass land is cleaner than most of the existing arable land; it is in much higher manurial condition; it is, therefore, capable of producing more corn within the next few years. Thus the admitted fact that the arable land is foul and exhausted only confirms the policy of ploughing up grass, and it must be remembered that much of that work can be done during the months of December, January and February, when operations on the arable land are largely

suspended. Though this land may not yield much in 1918 it will be ready for proper cropping in 1919 and 1920 when the need will be equally great.

6. It is the duty of Executive Committees to bring these facts home to every land-owner and farmer in the country and to appeal to them to share the national task. If their co-operation and assistance are invited, and if the land scheduled is carefully selected, there should be no fear of the result. But the full accomplishment of the task demands all the energy and enthusiasm of the Committees. In many districts objections and difficulties are certain to be raised. Yet very substantial reasons must be given by the occupier of grass land suitable for tillage before he is exempted from contributing his share to the national task.

7. Committees are urged, therefore, to lose no time in issuing notices to occupiers under paragraph 1 (*e*) of Regulation 2M, specifying the area of corn crops required on their farms and of the grass land which should be ploughed up. These notices should be issued in all cases, whether the occupier has expressed his willingness to do the work or not. But it should be carefully explained that the notice is given to safeguard rights to claim compensation in case of loss, and that objections will be considered by the Committee before the notice is enforced. A copy of the notice should in each case be sent to the owner of the land.

8. Notices should specify dates before which objections may be lodged and the dates by which the work must be commenced. They should also contain a clause stipulating that the work must be completed in a reasonable time. As a rule, occupiers should be required to complete the ploughing of old grass land before they plough temporary leys for spring sowing. When there are indications that a farmer is not making a serious effort to complete his ploughing, a notice requiring completion by a given date should be served. A copy of Food Production Leaflet No. 5, "Notes on Breaking Up Grass Land," might be enclosed with each notice issued. Copies of the Leaflet will be supplied on application to the Board at 3, St. James's Square, London, S.W. 1.

9. If the promises received, or the land scheduled, fall short of the quota allotted to your county, a further survey should be made, with the assistance of professional surveyors, if necessary, in order to make up the deficiency. The programme of the Department represents no more than is necessary for national security, and failure on the part of any counties, districts or individual farmers will weaken the national position, and may render fruitless the self-devotion of those who have made the supreme sacrifice of life in the service of their country.

10. The Department will be glad to receive at the earliest possible date a statement showing the quantity of grass land already scheduled in your county, the area promised for ploughing, and the acreage in respect of which notices have been served.

11. Copies of this letter are being printed and will be sent to you in a few days for distribution to your members, and to District Committees.

We are, etc.,

R. E. PROTHERO, *President of the Board of Agriculture.*
ARTHUR LEE, *Director-General of Food Production.*

THE following Memorandum, dated 6th November, 1917, has been sent by the Food Production Department of the Board to Agricultural Executive Committees in England and Wales:—

Scheme for the Supply of Teams of Horses in Charge of Ploughmen.

1. In connection with the Horse Scheme, F.P. 92, the Department have obtained the sanction of H.M. Treasury to the appointment of a Special Officer, to be called the Horse Officer, in each county, who shall be responsible for the working and success of this Scheme.

2. His duties will be to supervise all arrangements under the Scheme, and he will be responsible for the health and well-being of the horses and for all harness and implements issued thereunder.

3. More especially he will make, with the help of the District Committees, all arrangements for the itinerary of the gangs, the provision of accommodation for the horses, and the supply of fodder.

4 Agricultural Executive Committees are requested to nominate a suitable candidate for this position to the Director-General as soon as possible. The gentleman nominated should, if possible, be a local man, well known to the farmers of the county, and having a good knowledge of local conditions. Where County Executive Committees have already appointed a Horse Officer, it is desired that his name should be submitted with a special note that he has already been engaged on the work.

5. Executive Committees, when submitting the names of suitable candidates, are requested to indicate the salary which they consider adequate, but in no case can more than £200 per annum be paid, as this is the maximum sanctioned by the Treasury. Horse Officers will be entitled to the usual allowances under the Memorandum of the 12th July last, when absent from home, also an allowance for the use of motor car or motor cycle in accordance with the scale previously laid down, and clerical assistance, where necessary, not to exceed 25s. per week. The salary of the Horse Officer will be paid direct by the Department, but his expenses will be payable by the Executive Committee.

6. The Horse Officer must devote his whole time to the work. He will be directly responsible to the supervisor of the scheme at the head office, with whom he must keep in close touch.

7. He should be made a member of any sub-committee dealing with ploughing contracts and the supply of horses, so that he can receive instructions from the County Agricultural Executive Committee and render reports to them in connection with the Department's horses at work in the county. He will also keep the Agricultural Executive Committee informed of the districts where farmers are willing to use the gang system, of the arrangements he has made for housing and fodder, and of the itinerary he has mapped out in order to keep the gangs at work. He will work in close touch with the district committees, and it would be advisable for a representative of each district committee to be appointed to assist him, and act as his local representative. In any matters relating to the receipt or payment of moneys which the Executive Committee may desire to assign to the Horse Officer, the officer will be responsible directly to, and will account to, the Executive Committee, and not to this Department.

8. The Director-General wishes to impress upon Executive Committees the need for immediate action, so that the appointment of

suitable persons may be proceeded with without delay, as upon the thorough organisation of the horse gang scheme depends very largely the increased cultivation for the harvest of 1918. Such action especially desirable in view of the serious situation recently outlined to the chairmen of Executive Committees.

9. If a suitable man is not available in the county for this post, the Department may be able to assist the Executive Committee by submitting the names and qualifications of gentlemen who have applied for positions under the Department.

Horse-drawn Implements.

THE following Letter, dated 3rd November, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees in England and Wales :—

SIR,—I am directed to refer to the Circular Letter from this Department of the 12th July last, on the subject of horse-drawn and other implements.

The Department are now in a position to give delivery, either at once or in a few weeks, of the horse-drawn implements detailed in the enclosed list*; against each of the items the date of the first delivery at contractors' works is given.

I am to ask that your committee will state as soon as possible—

(*a*) The number of implements of each class and type which you can employ at present.

(*b*) The additional number of each class and type of implement which you consider you will ultimately require. Arrangements are under consideration whereby local implement dealers will store such implements until you require them.

Since it may not in each case be possible to offer to a county the type most favoured in that county, several types should therefore be specified, and the order of preference stated.

The implements may be used—

(*a*) For the purposes of the gang system as set out in F.P. 92.

(*b*) For hire with horses supplied to farmers with over eight acres of land to cultivate.

(*c*) For hire to farmers who have not been supplied with horses by the Department, but who are short of implements.

(*d*) Where adapted for use either with tractors or horses (harrows, rollers and land presses), for the purposes of the tractor scheme.

The charge to be made in the case of (*a*) is stated in F.P. 92 : in the case of (*b*) a similar charge of 1*s*. a day for implements supplied should be made, subject to the condition that they must be returned in good condition, and may be withdrawn for use with gangs. In the case of (*c*) a charge of 1*s*. a day for *each* implement should be made, subject to the same condition as in the case of (*b*). Implements required under (*d*) will be charged for under the tractor scheme on an acreage basis for the particular operation performed.

In making application for any of the implements included in the accompanying list* it should be stated whether they are required for use under (*a*), (*b*), (*c*) or (*d*).

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* Not here printed.

I am to add that in view of the fact that the Department can promise early delivery of implements of a large variety of types, local purchases will be sanctioned only in very exceptional circumstances. Such purchases will be made direct by the Department (as explained in the letter of the 12th July), and, before considering proposals to obtain implements locally, they will require to be very fully informed of the circumstances which, in the opinion of your committee, will justify this course.

I am, etc.,
HUGH M. STOBART,
Director of Machinery Supplies.

The Potatoes (Growers' Returns) Order, 1917.

AN Order [The Potatoes (Growers' Returns) Order, 1917, No. 1101], dated 30th October, 1917, has been made by the Food Controller under Regulation 2G of the Defence of the Realm Regulations, providing that—

1. *Monthly Returns as to Potatoes.*—All growers of potatoes shall within eight days from the first day of each month beginning with the month of November, 1917, furnish monthly returns of :—

(*a*) Estimated quantity of potatoes in his possession on the first day of the month in which the return falls to be made ;

(*b*) Quantity of potatoes consumed or delivered in the preceding month ; and

(*c*) Such other particulars as may be necessary to complete the prescribed forms of return.

Except that the return to be made as respects Ireland in the month of November, 1917, shall state the quantity of potatoes in the possession of the grower on the 8th November, 1917, instead of the 1st November, 1917, and may be furnished at any time before the 16th November, 1917.

The last return shall be made in respect of the month of May, 1918.

2. *Completion of Return.*—The returns shall be made on the forms prescribed by the Food Controller. The appropriate forms of return may be obtained from, and when completed, are to be returned to or in accordance with the directions of the Board of Agriculture and Fisheries, London, S.W. 1., as respects England and Wales ; the Board of Agriculture for Scotland, Edinburgh, as respects Scotland ; and the Department of Agriculture and Technical Instruction for Ireland, Dublin, as respects Ireland.

3. *Exception.*—A grower shall not be required to make a return under this Order—

(*a*) As respects potatoes grown in Wales or Monmouthshire if his total acreage there under potatoes in the year 1917 was less than two acres ; or

(*b*) As respects potatoes grown in the rest of Great Britain if his total acreage there under potatoes in the year 1917 was less than five acres ; or

(*c*) As respects potatoes grown in Ireland if his total acreage there under potatoes in the year 1917 was less than one acre.

THE following Circular Letter, dated 6th November, 1917, has been sent by the Food Production Department of the Board to Agricultural Executive Committees in England and Wales :—

Supply of Seed Potatoes for Planting in 1918.

DEAR SIR,—I shall be obliged if you will draw the immediate attention of your Committee, or the Supplies Sub-Committee, to the enclosed copy of the Department's scheme* for the supply of seed potatoes to growers for planting in 1918.

The scheme is divided into two sections, (1) for the provision of seed potatoes of varieties immune from Wart Disease for planting in Wart Disease infected areas, and (2) for the supply of certain non-immune varieties.

The immune varieties available are King George V., Great Scot, Lochar, Templar, Abundance (group), Irish Queen and Shamrock, and Agricultural Executive Committees who adopt the scheme may accept orders from both farmers and small growers who wish to plant in infected ground.

The distribution of the non-immune varieties, British Queen, Arran Chief, King Edward, Up-to-Date and President will be limited to small growers, and no individual grower can be supplied with more than 5 cwt. of these varieties. The object of this part of the scheme is to provide "seed" for allotment holders, cottage gardeners and others who are not in a position to secure good "seed" for themselves.

It is proposed that the distribution of seed potatoes under this scheme should take place either through the Supplies Sub-Committees or through the ordinary trade channels by means of "approved seed potato dealers," and your attention is specially directed to the arrangements outlined in the Memorandum in regard to the method to be followed in each case.

With regard to the supply of immune varieties, growers in districts infected with Wart Disease must obtain their "seed" either through the Department or from sources approved by the Department. The stocks held by the Department for this purpose are limited, and they will inform the Committees early in January if there is any doubt about their ability to execute the orders in full.

No applications for supplies can be entertained after the 15th December next, and your Committee are advised not to accept orders unless sent in by the 1st December.

I am directed to say that while it is necessary that the Committee should sell the potatoes at prices which will cover their cost and all charges for distribution, the allocation of any credit balance resulting from these transactions must be made only after obtaining the sanction of this Department.

Yours, etc.,
LAWRENCE WEAVER,
Director of Supplies.

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* Printed below.

Object of the Scheme.

1. The object of the scheme is two-fold :—

Scheme for the Distribution of Seed Potatoes through County Agricultural Executive Committees.

A.—*Supply of Immune Varieties.*

To provide seed potatoes, of varieties immune from Wart Disease, for planting in areas scheduled for Wart Disease This part of the Scheme is open to both large and small growers, and the varieties available are —

Mid Early.	*Maincrop*
King George V.	Abundance (group)
Great Scot	Lochar.
	Templar
	Irish Queen
	Shamrock

The quantities of certain of the varieties are limited, and no guarantee to supply any particular variety can be given Purchasers must be prepared to accept any one of these varieties

Those who propose to plant potatoes on land infected with Wart Disease are restricted to the use of immune varieties They must obtain the "seed" through the Department or from sources approved by the Board of Agriculture and Fisheries, and must conform in all other respects to the provisions of the Wart Disease Orders

B —*Supply of "Seed" of other Varieties*

To provide seed potatoes of other varieties, grown in Scotland or the North of Ireland, for allotment holders, cottage gardeners and other small growers who are often disadvantageously situated for obtaining supplies of this class No individual purchaser under this part of the Scheme may be supplied with more than 5 *cwt* This limit may be *reduced* at the discretion of the Agricultural Executive Committee The varieties available will be —

Mid Early	*Maincrop*
British Queen	King Edward VII
	Arran Chief
	Up-to-Date
	President

Organisation of Supply and Distribution.

Duties of Agricultural Executive Committees

2 Agricultural Executive Committees must be responsible for —

(*a*) Obtaining an estimate of the requirements of growers in the county under 1 (A) and 1(B), and for transmitting orders to the Department

(*b*) The distribution in the county of seed potatoes supplied through the Department, for securing local delivery to the purchasers, and for exercising a general supervision over the Scheme in their respective counties

Administration of the Scheme by the Committees.

3 (*a*) The Department desire to relieve Committees of the necessity for creating a voluntary system of distributing the "seed," and the method of distribution outlined in paragraphs 5 to 7 is suggested

(*b*) If, however, a Committee wishes to organise the Scheme within its area on other lines it may do so with the approval of the Department, but the Committee must then undertake the whole financial working of the Scheme, ordering their bulk requirements from the Department and making their own arrangements for the re-sale of the potatoes to the purchasers. Committees organising their own Scheme must pay the Department within one month for the potatoes supplied, invoice to the purchasers and collect the payments due. Committees must insist on payment on or before delivery. Where this alternative Scheme is preferred Committees should inform the Department by the 1st November, 1917.

Conditions to be observed.

4. Where, under paragraph 3 (*b*) Committees purchase seed potatoes from the Department and re-sell them to growers, the Committees must obtain from the Food Controller a licence to sell seed potatoes, under the Potatoes Order, 1917, and should entrust the distribution of the "seed" to an officer or officers appointed for the purpose. Sales by the committees will be subject to the Seed Potatoes 1917 Crop Order, 1917, unless any exception is specifically authorised by the Food Controller.

Method of Distribution.

5. In counties which adopt the method of distribution referred to in paragraph 3 (*a*) distribution to small growers should be effected through the ordinary channels of the trade. Agricultural Executive Committees should appoint "Approved Seed Potato Dealers" for this purpose. An offer should be made in the first instance to the "Approved Agents" already recognised by the Committees and by this Department to become "Approved Seed Potato Dealers," and, failing these, any local potato dealers of good repute may be appointed. The accompanying form* should be filled up in each case by the dealer, firm or society selected, and should be signed by the representative of the committee appointed for the purpose. The form should then be forwarded to this Department for approval of the appointment.

Storage of Supplies.

6. The Department cannot supply to any consignee less than 4 tons of any one variety, and the dealer should be prepared to provide accommodation for the storage of the potatoes to be consigned to him, or for a quantity sufficient to enable the Department to forward lots of not less than 4 tons of one variety to him at intervals. A list of directions to dealers is attached.*

Collection of Orders and Estimate of Requirements.

7. Each "Approved Seed Potato Dealer" should be authorised to supply a specified quantity of seed potatoes obtained through the Department to growers in an area prescribed by the Committee. In making the suggested appointments Committees should endeavour to assign to each dealer an area which will secure to him a reasonable volume of trade. Growers in the area should be instructed to apply to him in writing for their requirements and he should send to the Committee not later than the 1st December, 1917, particulars of the quantity of each variety which he requires. A form* is provided for

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* Not here printed.

this purpose. The particulars of the requirements of "Approved Seed Potato Dealers" for the county should be furnished to the Department by the Committee on the prescribed form as soon as possible after the 1st December, but in no case later than the 15th December.

Orders for 4 tons or more of One Variety for Individual Farmers or for Societies.

8. Where 4 tons or more of one variety are required by an individual farmer under 1 (A) or by societies or groups of small growers under 1 (A) or 1 (B) for delivery to the consignee's railway station, orders must be sent to the Department through the Committee.

Autumn Delivery to Farmers.

9. Farmers who require 4 tons and upwards of any one of the immune varieties under 1 (A), for planting considerable areas in the spring, should place their orders as soon as possible, and be prepared to accept delivery in the autumn.

Classes of Seed to be provided under 1 (A) and 1 (B).

10. Purchasers under 1 (A) must be prepared to accept Class I., II or III. seed, as defined in the Seed Potatoes 1917 Crop Order, 1917, or under both 1 (A) and 1 (B) any legitimate modification of the "dressing" prescribed by the Order.

Provision of Bags.

11. The potatoes will be dispatched in labelled bags containing 1 cwt., and orders cannot be accepted by the Department for any fraction of a cwt.

Limitation of Quantities ordered under 1 (B).

12. The Department cannot undertake to guarantee unlimited supplies of "seed," and reserve the right to refuse such portion of any order from a county under Scheme 1 (B) which exceeds 150 tons. The Department will, however, try to meet all reasonable demands, and would urge Committees to decide at once on the quantities and varieties which they are willing to take up to 150 tons. If a Committee decide to adopt this course and send to the Department at once an order for, say, 50 tons of each of three varieties, the price for these potatoes can be quoted f.o.r. or f.o.b. and the varieties can be guaranteed. In regard to orders received subsequently, the quantity and variety cannot be guaranteed, although the Department will make every endeavour to execute the order as received.

Prices.

Prices regulated by the Seed Potatoes 1917 Crop Order, 1917.

13. The maximum prices of seed potatoes and bags, the percentage chargeable on sales by the wholesale dealer and retailer and the "dressing" for "seed" of different varieties of potatoes are laid down in the Seed Potatoes 1917 Crop Order, 1917, with the provisions of which purchasers should be acquainted as fully as possible.

14. The aim of the Department is to provide good, sound "seed" true to type, and it is improbable that the price paid to the grower will fall below the maximum.

15. While the Department will take every reasonable precaution to secure sound "seed," true to type, they give no warranty expressed or

implied as to the quality, purity or productiveness of the potatoes supplied under this Scheme.

Payment.

Period within which Payment for " Seed " must be made.

16. Agricultural Executive Committees working the Scheme under paragraph 3 (*b*) must pay the Department for potatoes within one month after delivery. Approved seed potato dealers must pay the Department for the potatoes supplied within 14 days of the date of delivery. In the case of orders from farmers, societies, or groups of growers, provided for in paragraph 8, payment must be made to the Department *before delivery*. The Railway Company's account for carriage must be paid when rendered.

Dealers Responsible for the Collection of their own Accounts.

17. Where potatoes are sold through " Approved Seed Potato Dealers " payment will be made by the purchasers to the dealers who will be responsible for the collection of their own accounts.

Loss in Transit.

Claims for Short Weight.

18. Claims for short weight cannot be entertained by the Department except in cases where there is evidence that the total weight loaded on the railway trucks was insufficient.

Examination of Consignment on Arrival.

19. Each consignment should, accordingly, be examined on arrival, and the receipt given to the representative of the Railway Company should be for the actual quantity received only.

Procedure to be followed in Cases where Consignments are found to be Short.

20. Where the shortage is serious and beyond the limits attributable to shrinkage in transit, an account for the amount of the actual loss (invoice price) should be sent in at once by the consignee to the local agent of the delivering Railway Company. Full particulars of the quantity missing should be given, including the name of the sender, the station from which the consignment was dispatched, and the date of delivery.

General.

Enquiries from Small Growers regarding the Scheme.

21. The attention of the Committees is directed to the following points :—

(*a*) It would be a great convenience to all concerned if Committees would answer all enquiries either direct or through their local representatives. In many cases last season correspondents were referred to this Department, with the result that much time was taken up in replying to small growers and others all over the country on trifling points, which could have been at once dealt with by local representatives of the Committees. The Department will at all times be glad to assist the Committees in any difficulties that may arise, and in case of serious difficulties will send an inspector to meet the Committee.

Complaints as to Condition of Consignments.

(*b*) *Any complaints relating to deliveries must be made to the Department at once.*

Orders not to be Cancelled.

(*c*) Orders cannot be cancelled.

Damage by Frost and Shrinkage.

(*d*) The Department will not be prepared to entertain claims for damage by frost or loss from natural shrinkage save in very exceptional circumstances.

AN Order (No. 1081), dated 24th October, has been issued by the Food Controller to the effect that :—

The Milk Factories (Restriction) Order, 1917.

1. (*a*) *Milk Factories not to Take Increased Supplies of Milk.*—No person shall agree to take or acquire or after the 15th November, 1917, take or acquire for the purpose of a creamery, condensery, or other milk factory of any kind (all of which are hereinafter referred to as factories) any greater output of milk than was coming to such factory on 31st December, 1916, or on the 31st August, 1917, whichever was the greater. Such output is hereinafter referred to as " the standard output."

(*b*) *Supplies to be Measured by Number of Cows.*—For the purpose of this Clause an output of milk shall, so far as it consisted or consists of the whole or substantially the whole of the milk from any particular cows or from any particular farm or dairy (hereinafter referred to as "a dairy output "), be measureable by the number of cows contributing to it, notwithstanding differences or fluctuations of yield, except that the output of any farm or dairy shall be deemed to remain unchanged so long as it is taken for the purposes of the same factory, notwithstanding any variation not exceeding 10 per cent. in the number of cows at the farm or dairy.

2. *Returns to be made.*—All persons owning or having control of any factory shall, on or before the 8th November, 1917, furnish to the Food Controller a return, giving particulars of the output of milk coming to the factory on the 31st December, 1916, and of the milk coming to the factory on the 31st August, 1917, and of the milk coming to the factory on the 24th October, 1917, and such other particulars as may be required to complete the prescribed form of return. The return shall be made on forms prescribed by the Food Controller, to be obtained from, and when complete to be returned to, the Secretary of the Ministry of Food, Palace Chambers, Bridge Street, London, S.W.

3. *Notice of Changes in Supply.*—All persons owning or having control of any factory shall, whenever after the 24th October, 1917, any change is made in the output of milk taken for the purpose of the factory, or any new contract is entered into for the supply of milk for the purpose of the factory, within seven days thereafter, furnish to the Food Controller a notice in writing of such change or contract and deliver to him such particulars in relation thereto as he may require.

4. *Surplus Milk not to be Reckoned.*—The output of milk taken for the purposes of a factory shall, for the purposes of the preceding Clauses

of this Order, be reckoned exclusive of surplus milk taken from any dealer in milk not being the producer thereof, surplus milk meaning for this purpose such of the milk acquired by the dealer for the purpose of his own trade as is from time to time in excess of his requirements, provided always that whenever surplus milk is taken for the purposes of a factory, the person owning or having control of the factory shall keep a full record of the quantities of milk so taken and of the persons from whom the same is taken, and shall within eight days after the end of every month make a return to the Food Controller stating the total quantity of surplus milk so taken during the preceding month, the first return to be made in respect of the month of November, 1917, in all cases in which any surplus milk is taken in that month.

5. *Number of Cows at Dairy.*—Whenever, for the purpose of this Order, the number of cows contributing to a dairy output is required to be ascertained, only cows actually yielding milk or expected to calve within four months shall be counted. In ascertaining the number of cows at a farm or dairy as at the 31st December, 1916, and the 31st August, 1917, respectively, the number mentioned in the contract or contracts subsisting at those dates respectively, for the supply of milk to the factory from such farm or dairy, shall be deemed to be the actual number unless the contrary is shown.

6. *Records.*—Every person owning or having the control of a factory shall keep accurate records of all milk coming to or purchased for the purpose of such factory, and of the use of all such milk, and such records and all relevant documents shall be open for the inspection of any person authorised by the Food Controller.

7. *Milk Taken under Special Contracts.*—Wherever the standard output coming to a factory included milk other than milk constituting a dairy output (hereinafter referred to as "special contract milk"), or whenever after the 8th November, 1917, the milk coming to a factory (other than surplus milk) included special contract milk, the quantity of special contract milk, which is to be deemed equivalent to any dairy output or to any other special contract milk shall be ascertained in such manner and by reference to such period of time as the Food Controller shall, on application by the person owning or having control of the factory, from time to time determine, and no such person shall, after the 15th November, 1917, take for the purposes of the factory any special contract milk or take for such purpose any dairy output in lieu of any special contract milk included in the standard output of such factory, until an application shall have been made in relation thereto under this clause, and any person making such an application shall furnish to the Food Controller such particulars and information as the Food Controller requires.

8. *Contracts Existing at Date of Order.*—Where under any contract or contracts existing at the date of this Order the output of milk agreed to be taken for the purpose of a factory after the 15th November, 1917, exceeds the standard output, the Food Controller may make such arrangements as he shall think fit for reducing such output or for the disposal of the amount of such excess and may for that purpose cancel, reduce or modify or determine any contract or take over the whole or part of the milk agreed to be supplied thereunder.

9. *Milk may be Requisitioned.*—A person owning or having power to sell or dispose of milk for the time being coming to or lying at any milk

factory shall, at any time or from time to time place at the disposal of the Food Controller the whole or any part of such milk as may be directed by the Food Controller, and shall deliver the same to him or such person as shall be named by him in such quantities and at such time as the Food Controller may from time to time require.

10. *Price of Requisitioned Milk.*—The Food Controller will subsequently communicate to the owners of the milk taken over by him the prices which he will be prepared to pay for the same, and the arbitrator to determine in default of agreement the compensation to be paid for milk so taken over shall be appointed by the Lord Chief Justice of England.

11. *Interpretations.*—For the purpose of this Order the expression "milk factory" shall not include a place where milk is collected wholly or primarily for the purpose of distribution as whole milk and where no by-product of milk was manufactured except from surplus milk not required for such primary purpose.

12. *Penalties.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

13. *Ireland Excluded.*—This Order shall not apply to Ireland.

AN Order (No. 1110), dated 31st October, has been made by the Food Controller to the effect that :—

The Butter (Maximum Prices) (Amendment) Order, 1917.

1. *Principal Order.*—The Butter (Maximum Prices) Order, 1917, is in this Order referred to as the "Principal Order."

2. *First-hand Price.*—(*a*) For the purposes of the Principal Order the first-hand price for Irish creamery factory or farmers' butter in firkins shall be at the same rate as the first-hand price for the same butter in 56-lb. boxes.

(*b*) The first-hand price for any butter in rolls, bricks or prints of any greater weight than 1 lb. shall be at the same rate as for butter of the same variety in rolls, bricks or prints of 1 lb., and the first-hand price of any butter in rolls, bricks or prints of less weight than 1 lb. shall be at the same rate as for the butter of the same variety in rolls, bricks or prints of ½ lb.

(*c*) Where butter of any variety is sold in a form in respect of which no first-hand price is for the time being specifically provided, the lowest first-hand price for the time being applicable to that variety of butter in any form shall apply.

(*d*) Where in relation to any variety of imported butter no first hand price is for the time being prescribed, the Principal Order shall apply with the substitution of the price at which the butter is actually sold by the importer for the first-hand price.

3. *Blended Butter.*—(*a*) Butter blended in Great Britain shall in no case be sold by wholesale by the blender at a price exceeding the first-hand price or the alternative maximum price specified in the following sub-clauses of this Clause, whichever shall be the less.

(*b*) The alternative maximum price of blended butter shall be the cost price of the butter to the blender, with an addition at the rate of 2½*d*. per lb. of the butter as blended if sold in rolls, bricks or prints of 1 lb. or upwards, and at the rate of 3*d*. per lb. if sold in rolls, bricks or prints of less than 1 lb. and at the rate of 10*s*. per cwt. if sold in any other form. The prices fixed by this Clause are on the basis that the butter is delivered to the purchaser's ordinary business premises or to the consumer's premises, and if the sale is made for delivery elsewhere the price shall be correspondingly reduced.

(*c*) The cost price of the butter to the blender shall be taken to be the first-hand price for the time being of the butter, or the price actually paid by the blender, whichever is the less, with the addition of any cost of transport or marine or war risks insurance not covered by the first-hand price, including a fair charge for carriage in the blender's own van or cart, on the occasion of the purchase by the blender not exceeding the rate authorised by Clause (6) (*a*) of this Order, except where the butter of any variety used for blending is bought by the blender in bricks, rolls or prints, he shall be deemed to have purchased the same at the first-hand price of bulk butter of the same variety.

(*d*) Clause 4 of this Order shall not apply to a sale of blended butter in rolls, bricks or prints.

4. *Small Sales by Wholesale.*—Upon a sale by wholesale not exceeding 24 lb. of butter, not constituting a whole original package, a charge at the rate of ½*d*. per lb. may be made in addition to the maximum charge authorised by Clause 2 of the Principal Order, but if two or more sales are made by a dealer to the same purchaser in the same week, the said charge shall not be made in respect of any butter after the first 24 lb. so sold in the week.

5. *Sales by Second Wholesaler.*—(*a*) Where a quantity of butter not exceeding 56 lb. is sold to a retailer by a dealer who, upon his own purchase, paid a price which included the whole or part of the wholesale profit of 7*s*. 6*d*. per cwt. permitted by Clause 2 of the Principal Order, the dealer may, on the occasion of such sale, add to the price authorised by Clause 2 of the Principal Order a further sum at the rate of 4*s*. per cwt., and also if the wholesale profit included in the purchase price paid by him was at a less rate than 7*s*. 6*d*. per cwt., a further sum equal to the amount by which such wholesale profit fell short of 7*s*. 6*d*. per cwt.; Provided that if two or more sales are made by a dealer to the same purchaser in the same week the further charge authorised by this Clause shall not be made in respect of any butter after the first 56 lb. so sold in the week.

(*b*) The additional charge authorised by this Clause may, in cases to which Clause 4 of this Order applies, be made in addition to the charge at the rate of ½*d*. per lb. authorised by that Clause.

6. *Carriage of Butter by Wholesale Dealer.*—(*a*) Where butter is either on the purchase or on the sale thereof carried by a wholesale dealer in his own van or cart, he shall be deemed to have paid for carriage at the rate of 6*d*. per cwt. if the distance measured in a straight line is less than ten miles, or at the rate of 1*s*. per cwt. if the distance equals or exceeds that limit, but if the dealer carried the butter in his own cart or both upon his own purchase thereof and upon the sale thereof, the distances upon the two occasions measured separately in manner aforesaid shall be added together and the charge regulated by the total distance.

(*b*) Where butter is transported by sea any sum paid for marine and war risk insurance shall be treated as part of the cost of transport.

(*c*) On any wholesale dealing the part of the price which represents the cost of transport or carriage shall be separately stated in the invoice, but the details of the charge need not be stated unless required by the purchaser.

7. *Retail Prices.*—Where the price paid by a retail dealer for butter does not include delivery to his own retail premises, and the butter is carried to his retail premises in his own van or cart, he shall be deemed to have made a payment for such carriage at the rate of *6d.* per cwt. if the distance measured in a straight line is under ten miles or at the rate of *1s.* per cwt. if the distance equals or exceeds ten miles.

7. *Butter Blended by a Retailer.*—Where a retailer blends butter in a blending factory registered before the date of this Order pursuant to the Butter and Margarine Act, 1907, he may, in respect of such blending, treat the cost price of the butter as increased by a sum at the rate of *4s.* per cwt., calculated according to the weight off the butter as blended.

9. *Discount.*—Where on a sale of butter a discount is allowed at a rate not exceeding *2d.* in the £ for cash within any specified period not exceeding one calendar month, the price upon such butter sale shall, for the purpose of this Order, be reckoned at the full price before deducting discount.

10. *Purchasers may Rely upon Vendor's Statement.*—Where the maximum price at which butter may be sold by any person depends upon the amount of any sum or sums paid or payable in relation thereto by any former seller, such person shall be entitled to rely upon any written statement as to the amount of the sum or sums so paid or payable that may have been made to him by the person from whom he bought the butter, unless he has reason to suspect the truth of such statement.

11. *Wrappings Included in Prices.*—The maximum prices prescribed by the Principal Order or this Order include in each case suitable wrappings or packages.

12. *Prices to be Exhibited.*—Every retailer of butter shall, so long as he shall have any butter on sale, display prominently at the shop or other place of sale, a statement or statements showing the prices at which he is selling butter at such shop or place, and when he is selling different varieties of butter at different prices the statement or statements shall be in such form or so displayed as to show which is the price of each variety, and shall, on reasonable demand, give to any person authorised, pursuant to Clause 7 of the Principal Order, all such information as may be necessary for showing which of the documents and records mentioned in that Clause relate to the butter which he has for the time being on sale. No retailer of butter shall sell butter at a price higher than that shown on any such statement.

13. *Exception.*—The Principal Order and this Order shall not apply to sales of butter for immediate consumption in the ordinary course of a catering business.

14. *Amendment of Clause 4 (c) of the Principal Order.*—There shall be inserted after the word "butter" in the sixth line of Clause 4 (*c*) of the Principal Order the words "imported or made by the person in question."

15. *Principal Order to Take Effect as Amended.*—The Principal Order shall be read as varied so far as necessary to bring it into conformity with the provisions of this Order, and shall take effect as if the provisions of this Order had been originally incorporated therein, and Clauses 2 (*d*) and 4 (*d*) of the Principal Order are hereby rescinded.

Two Orders (Nos. 1093 and 1122), dated 26th October and 6th November respectively, have been issued by the Food Controller to the effect that:—

The Butter (Maximum Prices) Orders (Nos. 4 and 5), 1917.

Pursuant to Clause 1 (*a*) of the Butter (Maximum Prices) Order, 1917, the Food Controller hereby prescribes maximum prices at the rates set forth in the Schedule below as the first-hand prices for the several varieties of butter mentioned in the Schedule upon all sales of butter by or on behalf of the importer or maker thereof for delivery on or after the 26th October, 1917, and, as to Danish butter, on or after the 13th November, 1917, and as to all other varieties of butter, on or after the 6th November, 1917, respectively.

THE SCHEDULE:

	26th Oct.	*6th Nov.*	
Australian (*ex* port)	220/–	220/–	per 112 lb.
New Zealand (*ex* port)	224/–	224/–	,,
Argentine (*ex* port)	220/–	220/–	,,
Canadian (*ex* port)	224/–	224/–	,,
American (*ex* port)	220/–	220/–	,,
Danish (*ex* port)	—	229/–*	,,
Dutch (*ex* port)	—	229/–	,,
Irish Creamery, F.O.R.:—			
56-lb. boxes	224/–	224/–	per 112 lb. net.
28-lb. boxes and casks	225/–	225/–	,, ,,
Kegs	226/–	226/–	,, ,,
Rolls or Bricks (1 or 2 lb.)	238/–	238/–	,, ,,
Rolls, Bricks, or Prints ½ lb.)	242/8	242/8	,, ,,
Irish Factory or Farmers' Butter in original packages, F.O.R.:—			
56-lb. boxes	220/–	220/–	per 112 lb. net.
28-lb. boxes and casks	221/–	221/–	,, ,,
Kegs	222/–	222/–	,, ,,
Rolls or Bricks (1 or 2 lb.)	234/–	234/–	,, ,,
Rolls, Bricks or Prints (½ lb.)	238/8	238/8	,, ,,
Irish Farmers' Lump Butter, F.O R.	210/–	210/–	,, ,,
British-made Butter (*ex* Creamery, Factory or Farm)	230/–	230/–	,, ,,
Rolls or Bricks (1 or 2 lb.)	244/–	244/–	,, ,,
Rolls, Bricks or Prints (½ lb.)	248/8	248/8	,, ,,

NOTE.—The above prices are all for salted Butter. If unsalted 3*s*. per cwt. extra in each case.

French Fresh Rolls (*ex* port)	28/–	28/–	per dozen lb.
French Paris unsalted (*ex* port)	256/8	256/8	per 112 lb.
Blended Butter, English Factory, delivered:—			
Rolls and Bricks (1 or 2 lb.)	25/–	26/–	per dozen lb.
Rolls and Bricks (½ lb.)	25/3	26/3	,,
Prints (½ lb.)	25/9	26/9	,,

The first-hand prices for French and Blended Butters are the same whether salted or unsalted.

Except where the price is stated as a net price, discount shall be allowed at 2*d*. in the £ for cash within seven days, and at 1*d*. in the £ for cash within one calendar month.

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* After 13th November.

An Order (No. 1105), dated 31st October, has been made by the Food Controller to the effect that :—

The British Cheese Order, 1917.*

1. This Order applies only to cheese made in the United Kingdom, other than and except cream cheese, soft cheese, and re-made cheese, and the word "cheese" as used in this Order extends only to cheese so made, and with the same exceptions.

2. (*a*) Upon any sale of cheese by or on behalf of the maker thereof (not being a sale by retail), the maximum price shall be the price for the time being prescribed by the Food Controller as the maximum first-hand price for the cheese sold with the additions mentioned in Clause 7 of this Order in cases to which that Clause applies.

(*b*) Until further notice the maximum first-hand price for each of the varieties of cheese specified in the Schedule hereto shall be a price at the rate mentioned in relation thereto in the 2nd column of the same Schedule.

(*c*) A maximum price for the time being in force under this Clause is hereinafter referred to as a "maximum first-hand price," and the actual price at which any cheese is sold by the maker thereof (being a price not greater than the maximum first-hand price) is hereinafter referred to as the "actual first-hand price" of such cheese.

(*d*) Where the cheese is carried by the maker in his own cart or van, for or in the course of delivery to the purchaser, the maker may charge for such carriage at a rate not exceeding 6*d*. per cwt. if the distance in a straight line is less than 10 miles, or 1*s*. per cwt. if such distance equals or exceeds that limit.

3. (*a*) Upon a sale of cheese by or on behalf of any person other than the maker thereof (not being a sale by retail and except as provided by Clauses 4 and 5 of this Order) the maximum price shall be a price at the same rate per cwt. as the actual first-hand price of the cheese, with the addition of the following sums or such of them as may be applicable, viz. :—

(i) A sum at the rate of 8*s*. per cwt. in the case of Caerphilly cheese, and at the rate of 6*s*. per cwt. in the case of any other variety of cheese. The addition authorised by this sub-clause is hereinafter referred to as "the wholesale bulk profit."

(ii.) A further sum at the rate of 1*s*. 6*d*. per cwt. upon a sale of not exceeding 56 lb. in weight, such sum to be added once only to the price of any cheese.

(iii) The amount, if any, paid or payable in respect of the carriage or transport of the cheese.

(iv.) Where the cheese has been or is, either on the purchase or on the sale thereof, carried by the seller in his own van or cart, the seller may charge for such carriage at a rate not exceeding 6*d*. per cwt. if the distance in a straight line is less than 10 miles or 1*s*. per cwt. if such distance equals or exceeds that limit.

(*b*) The total sum charged in respect of carriage or transport shall be separately stated in the invoice upon any sale, but the details of the charge need not be stated unless required by the purchaser.

(*c*) The sum at the rate of 1*s*. 6*d*. per cwt. authorised by sub-section (*a*) (ii.) of this Clause shall not be added upon any sale of cheese if in the same week other cheese is sold by the same seller to the same buyer, amounting therewith to a quantity exceeding 56 lb., and if in any such case any part of the said sum is added upon an earlier sale the amount so added shall be allowed by way of deduction on the later sale.

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* See *Journal*, September, 1917, p. 677, and October, 1917, p. 776.

4. Where a dealer in cheese who has purchased any cheese direct from the maker thereof (hereinafter called "a first dealer") is selling the same to a dealer in cheese (hereinafter called "a second dealer") who is purchasing with a view to re-selling to a retail dealer or retail dealers, and if required by the seller so certifies in writing and undertakes to make the further payment prescribed by this Clause in case he otherwise deals with the same, then and in every such case the sum which may be added by the first dealer in respect of the wholesale bulk profit shall be reduced to 5*s.* per cwt. in respect of Caerphilly cheese, and 4*s.* per cwt. in respect of any other cheese. But if the second dealer deals with any such cheese otherwise than by resale to a retail dealer or retail dealers, he shall, within fourteen days, so inform the first dealer in writing, and shall pay to the first dealer a further sum equal to the difference between the wholesale bulk profit actually added by the first dealer in respect of the cheese so dealt with, and the amount which he might have added if the second dealer had not purchased for resale to a retail dealer or retail dealers.

5. Where a dealer sells by wholesale any cheese purchased by him at a price which included a sum in respect of the wholesale bulk profit he may, upon such resale, add to the price such a further sum in respect of wholesale bulk profit (not exceeding the sum which he might have so added if he had purchased the cheese direct from the maker) as will make up the total sum added to the price of the cheese in respect of the wholesale bulk profit to the rate of 10*s.* per cwt.

6. (*a*) The maximum price upon a sale of cheese by retail shall be the actual cost of the cheese sold, with an addition thereto at the rate of 2½*d.* per pound and such price shall include all charges for making delivery or giving credit.

(*b*) For the purpose of this Clause, the actual cost of cheese not made by the retailer shall be taken at the price paid or payable by him for the cheese (not exceeding the maximum price authorised by this Order) together with the amount (if any) paid or payable or deemed to have been paid by him in respect of transport and not included in such price, and the actual cost of cheese made by the retailer shall be the maximum first-hand price of such cheese together with the amount (if any) paid or deemed to have been paid by him in respect of transport.

(*c*) Where the price paid by a retail dealer for cheese does not include delivery to his own retail premises and the cheese is carried to his retail premises in his own cart or van he shall be deemed to have made a payment for such carriage at the rate of 6*d.* per cwt. if the distance in a straight line is under 10 miles, or at the rate of 1*s.* per cwt. if such distance equals or exceeds 10 miles.

7. (*a*) Any maker of cheese or dealer who, after the date when this Order comes into force, holds a whole milk cheese (other than cheese of the Caerphilly, Stilton, or Wensleydale types) for a period of not less than 14 days may, upon a sale of the cheese, add to the price authorised by the preceding Clauses of this Order a sum at the rate of 1*s.* per cwt. for every complete period of 14 days during which he has so held the same, such sum to be calculated according to the weight of the cheese when resold, provided always that:—

(i.) In applying this Clause to any cheese the first 21 days after the making thereof shall not be taken into account:

(ii.) In applying this Clause to cheese held by the maker thereof no time prior to the 1st December, 1917, shall be taken into account as part of a period of 14 days; and

(iii.) This Clause shall not apply to any cheese made after the date when this Order comes into force, unless it is indelibly marked immediately after it is made with the date of its manufacture.

(*b*) Except as provided by this Clause no addition shall be made to the price per pound of cheese to compensate for shrinkage.

(*c*) Where any addition is made to the price of any cheese by virtue of this Clause by any person other than the maker of the cheese a corresponding addition shall be deemed to have been made to the actual and maximum first-hand prices of the cheese.

(*d*) No person shall mark any cheese with a false or misleading date.

(*e*) The time in respect of which additions may be made to this price under this Clause shall cease so soon as the cheese is cut.

8. (*a*) A Food Control Committee may from time to time prescribe a scale of maximum prices applicable to sales of cheese by retail in their area, and may from time to time revoke or vary any scale so prescribed. Any scale prescribed under the powers conferred by this Clause shall be in accordance with any directions which may from time to time be given by the Food Controller.

(*b*) Where any scale has been so prescribed then (subject to any limitations or exceptions prescribed by the Committee) no cheese shall be sold by retail within the area of the Committee at prices exceeding the prices provided by the scale.

(*c*) Where the Food Controller so directs a Food Control Committee shall, in exercise of the powers and duties conferred by this clause, act in combination with any other Food Control Committee or Committees and in such case the scale or scales prescribed shall apply to the areas of all such Committees.

(*d*) Compliance with the terms of a scale prescribed under the provisions of this Clause shall not relieve any person from the necessity of complying with the provisions of Clause 6 of this Order.

9 No cheese other than Caerphilly cheese shall be delivered by the maker thereof within 21 days after it is made.

10. Where on any sale of cheese a discount is allowed at a rate of 2*d*. in the £ for cash in seven days, or at a rate of 1*d*. in the £ for cash in one month the price upon such sale shall, for the purpose of this Order, be reckoned at the full price before deducting the discount

11. The maximum prices prescribed by this Order include in each case suitable wrappings or packages.

12. Where the maximum price at which cheese may be sold by any person depends upon the amount of any sum or sums paid or payable in relation thereto by any former seller, such person shall be entitled to rely upon any written statement as to the amount of the sum or sums so paid or payable that may have been made to him by the person from whom he bought the cheese, unless he has reason to suspect the truth of such statement.

13. Every retailer of cheese shall, so long as he shall have any cheese on sale, display prominently at the shop or other place of sale a statement or statements showing the prices at which he is selling cheese at such shop or place, and when he is selling different varieties of cheese at different prices the statement or statements shall be in such form or so displayed as to show which is the price of each variety and shall on

reasonable demand give to any person authorised, pursuant to Clause 14 of this Order, all such information as may be necessary for showing which of the documents and records mentioned in that clause relate to the cheese which he has for the time being on sale. No retailer of cheese shall sell cheese at a price higher than that shown on any statement so displayed.

14. Every person dealing in cheese shall keep accurate records containing such particulars as are necessary to show whether or no he is complying with the provisions of this Order, so far as they relate to him or his trade, and shall make such returns as to his trade in cheese as may from time to time be required by the Food Controller or Food Control Committee. All such records and relevant documents shall be open to the inspection of any person authorised by the Food Controller or the Committee.

15. A person shall not sell or offer or expose for sale, or buy or offer to buy any cheese at prices exceeding the maximum prices provided by or under this Order, or in connection with any sale or disposition or proposed sale or disposition of cheese, enter or offer to enter into any artificial or fictitious transaction, or make or propose any unreasonable charge.

16. For the purpose of this Order the expression "Food Control Committee" means a Committee appointed in pursuance of the Food Control Committees (Constitution) Order, 1917, or as respects Ireland the Committee constituted for Ireland by the Food Controller.

A sale of cheese by the maker thereof shall not be deemed to be a sale by retail if the quantity sold exceeds 4 lb., or if the quantity sold, together with any other cheese sold in the same calendar week by the same maker to the same purchaser, exceeds a total of 8 lb.

17. Infringements of this Order are summary offences against the Defence of the Realm Regulations.

18. This Order shall not apply to sales of cheese for immediate consumption in the ordinary course of a catering business.

19. The Cheese (Maximum Prices) Order, 1917,* is hereby revoked as on the date when this Order comes into force, but without prejudice to any proceedings for infringements thereof.

THE SCHEDULE.

Variety of Cheeses.	*First-hand Prices for Delivery on or after 1st November, 1917.*		
	s.	*d.*	
Wensleydale and similar makes, ripened	1	7	per lb.
Stilton, ripened	1	7	„
Any Whole Milk Cheese not exceeding 2 lb. weight, uncut	1	6	„
Caerphilly	129	0	per cwt. of 112 lb.
All other Whole Milk Cheese ..	142	0	„ „
Partially-skimmed (British) ..	125	0	„ „

In all cases prices are *ex* factory or *ex* farm.

All these prices are subject to the following terms, namely:—

For cash within seven days, 2*d*. in the £ discount.

„ „ one month, 1*d*. in the £ discount.

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* See *Journal* September, 1917, p. 677, and October, 1917, p. 776.

The Cattle Feeding Cake and Meal and Miller's Offals (Maximum Prices) Order, 1917.

AN Order (No. 1107), The Cattle Feeding Cake and Meal and Miller's Offals (Maximum Prices) Order, 1917, dated 1st November, 1917, has been made by the Food Controller, under the Defence of the Realm Regulations, to the effect that:—

In exercise of the powers conferred upon him by the Defence of the Realm Regulations, and of all other powers, enabling him in that behalf, the Food Controller hereby Orders that except under the authority of the Food Controller the following regulations shall be observed by all persons concerned:—

1. *Maximum Prices for Cakes, Meals and Miller's Offals.*—No cattle feeding cake or meal or miller's offals of the varieties specified in the Schedule, may, after the 15th November, 1917, be sold at a price exceeding the maximum price applicable thereto, according to the provisions of this Order, and no compound cattle cake of a variety not specified in the Schedule, may, after the 15th November, be sold unless a maximum price shall have been prescribed therefor by the Food Controller.

2. *Amount of Maximum Prices.*—Subject as hereinafter provided, the maximum price on any sale of any cake, meal or offals of a variety specified in the Schedule shall be at the rate applicable according to the schedule or at such other rate, as may from time to time be prescribed by the Food Controller, and the maximum price on any sale of a compound cattle cake of a variety not specified in the Schedule, shall be at such rate as may fron time to time be prescribed by the Food Controller. Except that on a sale to a dealer by the maker, miller or importer, the rate shall be 6*s*. 3*d*. per ton lower than the rate mentioned in the Schedule or other the prescribed rate for the time being in force.

3. *Small Sales.*—Where the total amount of cake and meal, or the total amount of offals, as the case may be, sold and delivered by any one seller in any week to one buyer, is not more than two tons and is more than five cwt., a further sum at the rate of 5*s*. per ton may be added to the maximum price; and where such total amount is not more than 5 cwt., a further sum at the rate of 2*s*. per cwt. may be so added. Any amounts, which by reason of a later sale in any week have been overpaid or overcharged on an earlier sale in such week, shall be allowed as a deduction on the later sale.

4. *Kibbling.*—Where cake is kibbled a further sum at the rate of 5*s*. per ton may be added to the maximum price.

5. *Transport Charges.*—(*a*) The maximum prices are fixed on the basis that all transport charges after sale by the importer, maker or miller, are for the account of the ultimate buyer, and accordingly there may be added to the maximum price all transport charges after sale by the importer *ex* quay, free on rail or *ex* importer's warehouse in the case of imported cake meal and offals, and all transport charges after sale by the maker or miller *ex* factory or mill in the case of cake meal and offals, produced in the British Islands, provided that the transport charges so added shall be limited to any reasonable amounts actually paid or payable, and any other reasonable charges, representing cost of transport, not exceeding the customary charges.

(*b*) The amount added in respect of transport charges shall be shown as a separate item on the invoice relating to the sale.

6. *Bags*.—(*a*) Imported cakes, meals and offals shall be sold gross weight, bags included, no charges being made for bags.

(*b*) On a sale of cake meal or offals, made or produced in the British Islands, a charge at the rate of 2*s*. 6*d*. for each thick sack, and 1*s*. 6*d*. for each thin sack may be made. The amount charged shall be shown as a separate item on the invoice, and shall be repaid on the return of the sacks in good condition within one month of the date of invoice.

7. *Credit*.—The maximum prices under this Order are on the basis of net cash within 14 days of date of delivery. Interest may be charged in respect of monies then unpaid at a rate not higher than 6 per cent. per annum.

8. *Contracts*.—(*a*) Where any contract made after the date of this Order and subsisting on the 16th November, 1917, for the sale of any cake, meal or offals, provides for the payment of a price in excess of the permitted maximum price, the contract shall stand so far as concerns cake, meal or offals delivered before the 16th November, 1917, but shall be avoided so far as concerns cake, meal or offals agreed to be sold above the permitted maximum price which has not been so delivered.

(*b*) Nothing in this Order shall affect any contract made on or before the date of this Order.

9. *Shipment to Channel Islands and Isle of Man*.—Except under, and in accordance with, the terms of a licence granted by the Food Controller a person shall not after the 15th November, 1917, ship or consign any cake, meal or offals to any destination in the Channel Islands or the Isle of Man.

10. *Purchaser may Rely on Vendor's Statement as to Transport Charges*—Where the maximum price at which cake, meal or offals may be sold by any person depends upon the amount of any sums paid or charged for transport by any former seller or, in the case of a compound cattle cake, on the percentage of oils or albuminoids contained in such cake, such person shall be entitled to rely upon any written statement as to the amount of such sums that may have been given to him by the person from whom he bought the cake, meal or offals, unless he has reason to disbelieve the truth of such statement.

11. *Fictitious Transactions*.—No person shall sell, or buy, or offer to sell or buy, any cake, meal or offals to which this Order applies, at a price exceeding the price applicable under this Order, or in connection with the sale or disposition or proposed sale or disposition of any cake, meal or offals to which this Order applies, enter or offer to enter into any fictitious or artificial transaction or make or demand any charges exceeding or other than those permitted by this Order.

12. *Records*.—Every person dealing in any cake, meal or offals, shall keep accurate records, containing such particulars as are necessary to show whether or not he is complying with the provisions of the Order, so far as they relate to him or his trade, and shall make such returns as may from time to time be required by, or under, the authority of the Food Controller. All such records and documents shall, at all times, be open to the inspection of any person authorised by the Food Controller.

SCHEDULE OF MAXIMUM PRICES.

Home Manufactured Cakes.	*Per ton.*		
	£	s.	d.
Linseed cake	19	0	0
Cotton seed cake	14	10	0
Undecorticated ground nut cake	17	5	0
Decorticated ground nut cake	19	0	0
Palm kernel cake	13	15	0
Rape cake	14	0	0
Copra cake	16	5	0
Sesame cake	18	10	0

Home Manufactured Meals.	*Per ton.*		
	£	s.	d.
Palm kernel meal	13	10	0
Rape meal	14	0	0
Soya meal	18	15	0

Imported Cakes and Meals.	*Per ton.*		
	£	s.	d.
North American linseed cake	19	5	0
Argentine linseed cake	19	15	0
Canadian linseed cake	19	10	0
Australian linseed cake	19	10	0
Spanish and Portugese linseed cake	19	10	0
Egyptian cotton seed cake	15	0	0
Decorticated cotton seed meal	19	15	0
Decorticated cotton seed cake	19	15	0
Repressed cotton cake	20	15	0
Rangoon rice meal	16	10	0
Italian rice meal	14	10	0
Canadian rice meal	17	0	0
Egyptian rice meal	17	0	0
Hominy chop	17	15	0
Maize cake meal	17	5	0
Gluten feed	17	5	0

Compound Cakes.	*Per ton.*		
	£	s.	d.
Cakes containing not less than 7 per cent. oil, and not less than 20 per cent. albuminoids	17	15	0
Cakes containing not less than 6 per cent. oil, and not less than 20 per cent. albuminoids	17	10	0
Cakes containing not less than 6 per cent. oil, and not less than 17 per cent. albuminoids	17	7	6

Millers' Offals.	*Per ton.*		
	£	s.	d.
Fine Offals	14	0	0
Medium Offals	13	10	0
Broad Bran	14	0	0
Bran	13	0	0

THE following Notice, dated 27th October, 1917, has been issued by the Ministry of Food :—

Warning to Farmers, Owners of Grist Mills, and to Other Users of Grain.

Under the Wheat, Rye and Rice Restriction Order, and the Barley Restriction Order, the use for the feeding of animals and poultry of wheat and barley which are fit for manufacture into flour for human food is prohibited. In spite of this prohibition reports are received by the Food Controller from all parts of the country that animals and poultry are being fed on these grains. It has been suggested that this infringement is not caused by any wilful unpatriotic action, but arises from ignorance of the meaning of the Orders. Farmers and other users of grain are therefore warned that all wheat and barley which can be used for the manufacture of flour for human food is required and must in the National interest be reserved for that purpose. The feeding of animals or poultry with such grains is a summary offence against the law and is punishable by fine and imprisonment. The fact that wheat or barley is out of condition does not necessarily mean that it is unfit for milling. Such grain should not be used as feed for animals until it has been offered for sale to every available miller, dealer and maltster or owner of kilns. Arrangements have been made which it is hoped will lead to a market being available for such grains if in any way fit for the manufacture of flour for human consumption.

It is essential in the National interest that the Grain Orders issued by the Food Controller should be implicitly obeyed, and any person infringing them will be vigorously prosecuted.

Warning is also hereby given to owners of grist mills that it is a summary offence for them to aid or abet any person in the infringement of the Grain Orders, and that it is their duty in the National interest to report to the Food Controller without delay every case in which they are asked to prepare for animal consumption grain which could be used for the purpose of human consumption.

Cancelling of Orders by the Ministry of Food.

AN Order (No. 1106), dated 31st October, 1917, has been made by the Food Controller, revoking The Winter Beans Order, 1917,* and the Winter Oats and Rye (Restriction) Order, 1917.†

The following Order, dated 13th October, has been issued by the Minister of Munitions, and provides that on and from the 17th October :—

Order Fixing Maximum Prices for Compound Fertilisers.

2. For the purposes of this Order the maximum prices for compound fertilisers shall be as follows :—

(*a*) In the case of sales for delivery free on rail, cart, barge or ship at maker's works, the basis price for compound fertilisers of the description sold or purchased to be arrived at as provided in Clause 6 of this Order with the addition of a charge for mixing or compounding, bags and bagging, not exceeding 22*s*. 6*d*. per ton.

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* See *Journal*, August, p. 584. † See *Journal*, August, p. 583.

(*b*) In the case of sales for delivery elsewhere than at maker's works the maximum prices authorised under paragraph (*a*) with the following additions, namely :—

(i.) In the case of sales for delivery *ex* vendor's store or shop or *ex* warehouse, the following extra distribution charges according to the quantity of fertiliser included in the sale, namely :—

Quantity Sold.	*Additional Price Authorised.* *s.*	*d.*	
4 tons and over	5	0	per ton.
1 ton and over, but less than 4 tons ..	10	0	,,
2 cwt. and over, but less than 1 ton ..	1	0	per cwt.
1 cwt. and over, but less than 2 cwt. ..	1	6	,,
Less than 1 cwt.	2	0	,,

(ii.) In the case of sales for delivery *ex* railway goods yard or public wharf, an extra distribution charge at the rate of 2*s*. 6*d*. per ton of fertiliser included in the sale.

(iii.) In the case of all sales for delivery elsewhere than at maker's works all costs of transport of the fertiliser from maker's works to place of delivery, any cartage or haulage to be charged at local rates.

3. On sales of two tons and upwards by makers to agricultural merchants and dealers or to co-operative companies and societies incorporated or registered under the Industrial and Provident Societies Acts or any other Act the maximum prices fixed by Clause 2 of this Order shall be reduced by a discount or allowance to the purchaser, such discount to be 5*s*. per ton where the maximum price of the fertiliser (after deduction of such discount) is less than £6 per ton, and 7*s*. 6*d*. per ton where the maximum price (after deduction of a 5*s*. discount) is £6 per ton or upwards.

4. The maximum prices fixed by this Order are net prompt cash prices for compound fertiliser in maker's or vendor's bags or other packages. Where credit is given to the purchaser a reasonable extra charge may be made, provided that the discount allowed for net prompt cash is quoted on the invoice, and is such as to bring the net prompt cash price within the maximum authorised. If the purchaser's bags or other packages are used a reasonable allowance shall be made. Where one ton or upwards of fertiliser is sold for delivery in bags containing not more than 1 cwt. each an extra charge of 5*s*. per ton may be made beyond the maximum price which would otherwise have been authorised.

5. The maximum prices fixed by the foregoing provisions of this Order are for sales of fertilisers for delivery during December, 1917. In the case of sales of fertilisers for delivery during other months, the maximum prices are in each case to be reduced or increased 1*s*. per ton per month, according as the month for delivery precedes or is subsequent to December, 1917, but with a maximum increase of 5*s*. per ton, *e.g.*, the maximum prices for sales for October, 1917, delivery will be 2*s*. less per ton, while the maximum prices for sales for May and June, 1918, delivery will be 5*s*. more per ton than the maximum prices fixed as above for sales for December, 1917, deliveries.

6. For the purpose of Clauses 2 and 7 of this Order the basis price for any compound fertiliser shall be the aggregate value of the nitrogen, phosphates and potash contained in the fertiliser when valued at the respective unit rates specified in the First Schedule hereto, and distinguishing in the case of nitrogen between the two classes of nitrogen, and in the case of phosphates between the different descriptions of phosphates, also specified in the First Schedule. In arriving at such basis price nothing shall be allowed or added for the value of any constituents other than nitrogen, phosphates and potash contained in the fertiliser.

7. As on and from the date on which this Order takes effect no person shall sell any compound fertiliser without giving to the purchaser on or before or as soon as possible after delivery an invoice stating—

(*a*) The percentage contained in such compound fertiliser of each of the following constituents contained therein, namely:—(i.) Class 1, nitrogen, (ii.) Class 2, nitrogen, (iii.) water soluble phosphate, (iv.) citric soluble phosphate, (v.) insoluble phosphate, and (vi.) soluble potash, all as more particularly defined in the First Schedule hereto (such percentages to be stated accurately in the case of each constituent within the limits of error specified in the Second Schedule hereto):

(*b*) The maximum unit rates authorised to be charged for each of such constituents as specified in the First Schedule hereto;

(*c*) The basis price for such fertiliser in which may, however, be included any charge made for credit;

(*d*) All additions made to such basis price in arriving at the actual price charged for such fertiliser (including the maker's charge, not exceeding 22*s*. 6*d* per ton, for mixing and compounding, bags and bagging); and

(*e*) The price charged for the fertiliser, and where such price includes an extra charge for credit, the discount allowed for net prompt cash.

8. The foregoing provisions of this Order shall not apply to any sale of compound fertiliser for export from the United Kingdom, nor to any sale of any quantity of compound fertiliser not exceeding 28 lb., nor to any sale of compound fertiliser in quantities exceeding 28 lb. where such fertiliser is sold for horticultural purposes packed in special bags, tins, boxes or cartons, each branded or marked with the maker's or vendor's name and address, and the words "Horticultural Fertiliser" and containing not more than 28 lb. But save as aforesaid no person shall as on and from the date on which this Order takes effect sell or purchase or offer to sell or purchase any compound fertiliser at a price exceeding that prescribed by this Order as the maximum price (having regard to quantity, composition, packages, date for and terms of delivery) for such sale. Provided that no person shall be liable to conviction for:—

(*a*) Selling a compound fertiliser at a price in excess of the maximum price prescribed by this Order if the invoice given to the purchaser, as required by Clasue 7 of this Order states accurately within the limits of error allowed by that Clause the percentages of the different constituents therein referred to contained in the fertiliser sold, and the price charged and stated on such invoice does not exceed the correct maximum price on the basis that the percentages stated in such invoice are correct, or

(*b*) Purchasing any compound fertiliser at a price exceeding the maximum price unless the price agreed to be paid by him is to his knowledge in excess of the maximum price authorised for such purchase.

9. All persons engaged in producing, making, selling, distributing or storing compound fertilisers, shall make such returns with regard to their businesses, and shall verify the same in such manner (including production of their books to any accredited representatives of the Minister of Munitions) as shall from time to time be required by or under the authority of the Minister of Munitions.

10. For the purpose of this Order and the Schedules hereto, the following expressions shall have the following meanings :—

The Act shall mean the Fertilisers and Feeding Stuffs Act, 1906.

The Regulations shall mean the Fertilisers and Feeding Stuffs (Methods of Analysis) Regulations, 1908.

Potash shall mean compounds of potassium calculated as potassium oxide soluble in water or acid as provided by the Regulations.

Unit shall mean 1 per cent. by weight in 1 ton of compound fertiliser.

Compound Fertiliser shall mean any fertiliser or substance sold for use as a fertiliser of which the ingredients are or contain nitrogen, phosphates and potash or any two of these constituents and in which either such constituents have been brought together or the percentage of any one or more of them has been increased or reduced by artificial mixing, but shall not include any substance containing in the natural state two or all of the said constituents, or any fertiliser made by dissolving or treating any such natural substance without any such artificial mixing as aforesaid.

Maker shall mean a mixer or compounder of compound fertilisers.

11. The provisions of this Order shall not apply to a sale by a maker to a consumer of two or more fertilisers or substances neither of which is by itself a compound fertiliser as above defined, notwithstanding that it is one of the terms of the purchase that the fertilisers or substances purchased are to be artificially mixed or compounded by the maker before delivery, provided that an invoice is given to the consumer on or before or as soon as possible after delivery which states the quantity and price of each of the fertilisers or substances included in the mixture or compound as delivered and the charge made for mixing or compounding, bags and bagging.

12. Nothing contained in this Order shall be held to vary or supersede any of the provisions of the Act or any Regulations made thereunder or to exempt any person from compliance with any of the provisions or requirements of such Act or Regulations applicable to sales or purchases of compound fertilisers.

Note.—All applications in reference to this Order should be addressed to the Director of Acid Supplies, Ministry of Munitions, Department of Explosives Supply, Storey's Gate, Westminster, S.W. 1, and marked "Fertilisers."

THE FIRST SCHEDULE.

Unit rates of nitrogen, phosphates and potash for the purpose of Clauses 2 and 6 of the above Order.

PART I.—NITROGEN.

Class 1.	*Unit Rate.* *s.*	*d.*
Derived from sulphate of ammonia, salts of ammonia, nitrate of soda, or other salts of nitric acid, cyanamide, meat, blood, bone, slaughter-house refuse, horn, hoof, guano, fish offal, fish meal, fish guano, oil seed, cakes or meals, or dissolved shoddy, dissolved wool waste or dissolved silk waste as below defined	17	6

Note.—The expressions "dissolved shoddy," "dissolved wool waste," and "dissolved silk waste" shall mean shoddy wool waste and silk waste treated with sulphuric acid or nitre cake in such a way that at least 80 per cent. of the fibre is destroyed.

Class 2.	*Unit Rate.* *s.*	*d.*
Derived from other sources	7	6

PART II.—PHOSPHATES.

Description.		
"Water Soluble," *i.e.*, rendered soluble in water ..	4	3
"Citric Soluble," *i.e.*, insoluble in water, but soluble in a 2 per cent. solution of citric acid in the manner prescribed by the Regulations	2	6
"Insoluble," *i.e.*, insoluble either in water or in a 2 per cent. solution of citric acid in the manner prescribed by the Regulations	1	6

PART III.—POTASH.

Description.		
"Soluble," *i.e.*, soluble by the methods prescribed by the Regulations	21	6

THE SECOND SCHEDULE.

Limits of error referred to in Clauses 7 and 8 of the above Order.

Nitrogen, Class 1.	Nitrogen, Class 2.	Phosphate, Water Soluble.	Phosphate, Citric Soluble.	Phosphate, Insoluble.	Potash, Soluble.	—
·3	·3	1	1	1	·3	If the percentage of potash stated in the invoice does not exceed 4.
—	—	—	—	—	5	If such percentage exceeds 4.

Note.—The above percentages for limits of error are percentages of the whole bulk of the compound fertiliser.

THE following Order, dated 17th October, has been issued by the Minister of Munitions to the effect that:—

Potassium Compounds Order.

1. No person shall as from the date hereof until further notice offer to purchase, purchase or take delivery of any potassium compounds as defined in Clause 3 hereof except under and in accordance with the terms of a licence issued on behalf of the Minister of Munitions by the Controller of Potash Production, or offer to sell, supply or deliver any such potassium compounds to any person other than the holder of such a licence and in accordance with the terms thereof; provided that no such licence shall be required—

(*a*) by the Admiralty or War Office,

(*b*) by any person for the purchase and delivery of potassium compounds in quantities not exceeding in weight an aggregate of 3 lb. avoirdupois during any one calendar month.

2. All persons shall furnish returns to the Controller of Potash Production at the times and in the manner prescribed by him of all potassium compounds held in stock by them or otherwise under their control, or manufactured, produced, bought, sold or otherwise dealt in by them.

3. The potassium compounds to which this Order relates are caustic potash (KOH) chloride or muriate of potash (KCl) carbonate of potash (K_2CO_3) and sulphate of potash (K_2SO_4) whether in a pure or in a commercial form, and any material (other than blast-furnace dust referred to in the Order of the Minister of Munitions of 7th August, 1917) of which more than ten per cent. consists of any one or more of the above.

4. All applications in reference to the above Order to be addressed to the Controller of Potash Production, Ministry of Munitions, 117, Piccadilly, W. 1.

Workmen's Compensation (War Addition) Act, 1917.

UNDER the terms of the Workmen's Compensation (War Addition) Act, 1917, which became law on the 21st August last, provision is made for a temporary addition as from 1st September 1917, to the weekly payments payable during *total incapacity*, under the terms of the Workmen's Compensation Act, 1906, whether such incapacity arose before 1st September or on or after that date, in respect of any week within the period for which the new Act continues in force, *i.e.* from 1st September, inclusive, to the end of a period six months after the War. The addition is a sum equal to one-fourth of the amount of the weekly payment.

Acorns for Pig-Feeding.

THE President of the Board of Agriculture and Fisheries again urges upon stock-keepers the great importance of making full use of the present abundant crop of acorns. Grain of all kinds must be conserved for human consumption; other food material must be used in the feeding of stock.

In general composition acorns closely resemble the cereal grains, and require only the addition of green fodder and such foods as are rich in flesh-forming materials, *e.g.*, oilcakes and milling offals, to constitute a suitable diet for growing or fattening animals. Acorns are specially adapted for pig-feeding and can often be used most effectively and economically when pigs are allowed to gather them where they fall.

Owners and occupiers of land containing oak-trees are urged, therefore, to take all possible steps to see that acorns are not wasted. While it will still be necessary to prevent the indiscriminate straying of pigs, the Home Office concurs with the Board in thinking that, if in consequence of this notice the number of pigs found straying on highways by the police should increase, proceedings against their owners should not be instituted except when direct negligence on the part of the owners is shown.

Full particulars as to the feeding and food value of acorns will be found in the Board's Leaflet No. 291, copies of which may be obtained free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

Women Tractor Drivers.

THE Food Production Department of the Board of Agriculture are in urgent need of women over 20 years of age for motor-tractor work. The terms offered are free training (probably of one month's duration), free outfit and travelling expenses. After training, 25*s.* per week will be given for the first two weeks, 30*s.* per week for the next two weeks, and after that a regular salary of 30*s.* per week with a bonus of 1*s.* per acre ploughed. When not employed on the tractors the women will be required to do general farm work. Further particulars and terms of service can be obtained from the Food Production Department, 72, Victoria Street, S.W. 1.

Binder Twine for Farmers.

AN arrangement has been made by the Ministry of Munitions, in conjunction with the Food Production Department of the Board, for the manufacture of binder twine in this country and its sale to farmers. The twine will be standard binder twine with an average length of 500 feet to the lb. and with an average breaking strain of 110 lb per length of 8 in. The retail price to farmers at the present time is 115*s.* per cwt. net cash delivered by the manufacturers to any railway station and this price will not be reduced before next harvest. Should raw material become scarce, and wages, etc., increase, then the price would have to be reconsidered and advanced. Farmers are therefore strongly recommended to book their orders early, and to take delivery early, so that they may be quite sure of their twine for next harvest. This will also assist to prevent congestion on the railways next spring. Orders should be placed by farmers with the agricultural merchants from whom they usually obtain binder twine.

Director of Milk Supplies.

THE Food Controller announces that Mr. Wilfred Buckley, Moundsmere Manor, Basingstoke, has accepted the post of Director of Milk Supplies. Mr. Buckley is Chairman of the National Clean Milk Society; he is a member of the War Agricultural Executive Committee of Hampshire, and he has been identified for some years with the movement for better and cleaner milk supplies.

Imported Oats: Prices.

THE Royal Commission on Wheat Supplies announce that the prices fixed for imported oats are to remain unchanged until 30th November, 1917.

The Pigs (Maximum Prices) Order, 1917.

AN Order (No. 1124), dated 6th November, 1917, has been made by the Food Controller under the Defence of the Realm Regulations, providing that :—

1. *Maximum Price for Pigs and Carcasses of Pigs.*—(*a*) No person shall, after the 8th November, 1917, buy or sell any live pig at a price exceeding the rate of 18*s*. per score of the live weight; provided that where a purchaser buys not less than five pigs on any occasion from the same vendor, the maximum price shall be deemed not to have been exceeded, if the total sum paid for such pigs does not exceed the sum that might properly have been paid if each pig had been bought and paid for separately.

(*b*) The weight of a pig for the purposes of this Clause shall be taken to be its live weight as ascertained at any time after sale, by a person authorised in that behalf by the Food Controller or a Food Committee, or if not so ascertained its weight at the place of slaughter; and any directions given by such person, with a view to the weighing of a pig for the purposes of this Order shall be duly complied with by all persons concerned.

2. *Records.*—Every person who in the course of his business buys any pigs alive and slaughters or causes to be slaughtered such pigs for the purpose of his business shall keep accurate records showing the prices paid for such pigs and such other particulars as are necessary to show whether or not the provisions of this Order are being complied with, and shall make such returns as to his business as the Food Controller or a Food Committee may from time to time require. All such records and relevant documents shall be open to the inspection of any person authorised by the Food Controller or the Food Committee.

3. *Offers and Conditions.*—No person shall, in connection with the sale or disposal of any pigs, enter or offer to enter into any fictitious or artificial transactions, or make or demand any unreasonable charge.

4. This Order shall not apply to boars or pedigree sows bought or sold specially for breeding purposes.

5. *Amendment of Meat (Maximum Prices) Order, 1917.*—The Meat (Maximum Prices) Order, 1917, shall be amended by the addition at the end of the Schedule thereto of the following provision :—

> In the the case of pork other than imported pork, the maximum rate of 9*s*. 6*d*. per stone is applicable, if the offals are not included in the sale; and the maximum rate shall be 6*d*. higher if the offals are included in the sale. In each case the weight of the offals shall be excluded in ascertaining the weight of the carcasses.

6. *Interpretation.*—For the purpose of this Order :

"Score" means 20 lb.

"Food Committee" means in respect of any area in Great Britain a Food Control Committee constituted in pursuance of the Food Control Committees (Constitution) Order, 1917, and in respect of Ireland the Food Control Committee appointed for Ireland by the Food Controller.

The Ministry of Munitions and Agricultural Machinery.

THE following communication has been made to the Board by the Ministry of Munitions :—

With a view to removing possible misunderstanding of the functions of the Agricultural Machinery Department of the Ministry of Munitions as regards the supply of agricultural machinery, implements, fuel and accessories, it is to be noted that these functions are confined solely to the carrying out of Government orders for such material received from the Boards of Agriculture for England, Scotland and Ireland, the issuing of permits to manufacturers, the control of imports and exports ; and to giving general assistance to manufacturers in the execution of their orders, whether Government or private.

The supply of the above-mentioned commodities to the consumer, in so far as it is undertaken by the Government, is in the hands of the Food Production Department of the Board of Agriculture, to whom all communications on the subject should be addressed (72, Victoria Street, London, S.W. 1).

Testing of Seeds.

FARMERS who wish to have samples of seeds (including seed grain) tested, should send them to the *Seed Testing Station* which has been established at the Food Production Department. Samples should be enclosed in a strong envelope and addressed to the Director-General, Food Production Department, 72, Victoria Street, London, S.W. 1. The envelope should be marked "*Seed Testing Station*" in the top left-hand corner. A fee of 3*d*. should accompany each sample.

A Leaflet on *Economy in the Use of Seed Grain* has been prepared, and may be obtained free (and post free) on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

Produce of Hops.

PRELIMINARY STATEMENT showing the estimated total production of hops in the years 1917 and 1916, with the acreage and estimated average yield per statute acre in each county of England in which hops are grown.

COUNTIES, &c.		Estimated Total Produce.		Acreage Returned on 4th June.		Estimated Average Yield per Acre.	
		1917.	1916.	**1917.**	1916.	**1917.**	1916.
		Cwt.	Cwt.	Acres.	Acres.	Cwt.	Cwt.
KENT	East ..	**31,116**	53,511	**2,351**	5,326	**13·24**	10·05
	Mid ..	**59,696**	68,980	**3,667**	6,467	**16·28**	10.67
	Weald ..	**59,084**	73,598	**4,447**	7,706	**13·29**	9·55
	Total, Kent	**149,896**	196,089	**10,465**	19,499	**14·32**	10·06
HANTS		**11,578**	15,517	**790**	1,380	**14·66**	11·24
HEREFORD		**29,536**	42,833	**2,629**	4,645	**11·23**	9·22
SURREY		**1,474**	3,562	**189**	426	**7·80**	8·36
SUSSEX		**16,049**	25,816	**1,478**	2,656	**10·86**	9·72
WORCESTER ..		**11,762**	23,182	**1,342**	2,643	**8·76**	8·77
OTHER COUNTIES ..		**424**	857	**53**	103	**8·00**	8·32
TOTAL		**220,719**	307,856	**16,946**	31,352	**13·02**	9·82

NOTE.—The yield per acre, 13·02 cwt., is almost 3¼ cwt. more than last year, and 3½ cwt. above the ten-year average. The crop is best in Kent and Hampshire, in both of which counties the yield is between 14 and 15 cwt. per acre. The total production, owing to the reduced acreage, amounts to 220,719 cwt., or 87,000 cwt. less than last year, and 118,000 cwt. below the ten-year average.

Agricultural Returns of England and Wales, 1917. Produce of Crops.

PRELIMINARY STATEMENT (dated 6th November, 1917) showing the estimated total produce and yield per acre of the corn, pulse, and hay crops in England and Wales in the year 1917, with comparisons for 1916, and the avarage yield per acre of the ten years 1907–1916.

—	Crops	Estimated Total Produce		Acreage.		Average Estimated Yie'd per acre.		Average of the Ten Years, 1907-1916.
		1917.	1916	1917	1916.	1917.	1916.	
		Quarters	Quarters.	Acres.	Acres.	Bush.	Bush.	Bush
ENGLAND AND WALES	Wheat	7,164,649	6,835,408	1,918 485	1,912,208	29·88	28·60	31 49
	Barley	5,539,514	5,180,926	1,459 888	1,332,076	30·36	31 11	32 44
	Oats ...	10.866,765	10,410,993	2 258,817	2,084,661	38·49	39·95	40 03
	Beans	436 810	862,377	208,399	228,586	17·16	30·18	29 40
	Peas	276,895	260,105	102,962	,266	21·51	24 40	25·08
		Tons	Tons			Cwt.	Cwt.	Cwt.
	SeedsHay*	2,405,468	2,898,804	1,681,899	1,762,699	28·60	32 89	29·54
	Meadow Hay†	5,149,537	5,938,786	4,794,213	4,825,988	21·48	24 61	23·18
		Quarters.	Quarters			Bush	Bush	Bush.
ENGLAND.	Wheat	6,954,184	6,657,781	1,854 870	1,862,211	29·99	28 60	31 49
	Barley	5,198,744	4,849,962	1,364 722	1,244,639	30·48	31 17	32 55
	Oats	9,812,408	9,412,818	2.012,627	1,862,489	39·00	40 43	40·55
	Beans	432,741	858,835	202,331	227,612	17·11	30 19	29 41
	Peas	275,392	259,014	102,374	84,847	21·52	24·42	25 69
		Tons	Tons			Cwt.	Cwt	Cwt
	Seeds Hay	2,184,070	2,647,113	1,504,255	1,581,615	29 04	33 47	29 97
	Meadow Hay	4,623,735	5,325,150	4,246,066	4,270,042	21·78	24 94	23 55
		Quarters.	Quarters			Bush	Bush	Bush
WALES	Wheat	210,465	177,627	63,615	49,997	26 47	28·42	27 71
	Barley	340,770	330,064	95,166	87,437	28·65	30·28	30 73
	Oats ..	1,054,357	998,175	246,190	222,172	34·26	35 94	35 21
	Beans .	3,569	3,542	1,068	974	26·73	29 09	27 47
	Peas ..	1,503	1,091	588	419	20·45	20 83	22 55
		Tons	Tons.			Cwt	Cwt.	Cwt
	Seeds Hay	221,398	251,691	177,644	181,084	24·93	27 80	25 76
	Meadow Hay	525,802	613,636	548,147	555,946	19·18	22 08	20 26

* Hay from Clover. Sainfoin, and Grasses under rotation + Hay from Permanent Grass.

NOTE —The total production of wheat in England and Wales in 1917 is estimated at 7,164,649 qr., or 330,000 qr. more than last year; and the yield per acre, 29·88 bush , is 1¼ bush. greater than in 1916, though 1½ bush. below the average of the ten years, 1907–16. Although the yield per acre of barley is three-fourths of a bush, smaller than in 1916, the total production 5,539,514 qr., is 360,000 qr. greater, owing to the increased area under this crop. The total production of oats, 10,866,765 qr., is 450,000 qr. more than in 1916, and the largest crop since 1907. This large crop is due to the increased area, as the yield per acre is 1½ bush. less than a year ago, and about the same amount below average. Beans are a very poor crop, and are the smallest crop recorded since 1885, both in total production and yield per acre. Peas are rather more satisfactory, and the total production is slightly greater than last year, but still much below normal.

The total production of hay from clover and rotation grasses is 2,405,468 tons, or nearly 500,000 tons less than the large crop of last year. The yield per acre, 28·60 cwt., is 4¼ cwt. lighter than in 1916, and nearly 1 cwt. below average. The total production of hay from permanent grass, 5,149,537 tons, is also less than in 1916 by some 800,000 tons ; the yield per acre in this case being rather over 3 cwt. less than last year, and 1¾ cwt. under average. Taking all kinds of hay together, the total production is 7,550,000 tons, which is 1,280,000 tons less than last year, but nearly 1,000,000 tons more than the total production in 1915.

The estimate of the hop crop was issued on the 15th ult. ; the returns of the production of potatoes and roots are collected at a later date, and will be issued subsequently.

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

The *International Crop Report and Agricultural Statistics* for October, 1917, published by the International Institute of Agriculture, contains estimates of the production of cereal crops in the Northern Hemisphere. The countries in respect of which it is possible to give estimates are as follows: In *Europe*—Spain, France, Scotland, Ireland, Italy, Netherlands, Sweden, Switzerland; in *America*—Canada, United States; in *Asia*—British India, Japan; in *Africa*—Algeria. *Wheat.*—In the above-mentioned countries the total production is estimated at 221,758,000 qr. in 1917, against 223,950,000 qr. in 1916, a decrease of 1·0 per cent., while the area sown was smaller by 3·2 per cent. *Rye.*—In the specified countries, excluding Scotland, British India, Japan and Algeria, the yield is placed at 17,066,000 qr. this year, against 18,002,000 qr. last year, a decrease of 5·2 per cent., the area sown being greater by 4·4 per cent. *Barley.*—The production in the above named countries, exclusive of British India, is estimated to amount to 62,040,000 qr. in 1917, against 62,250,000 qr. in 1916, a decrease of 0·3 per cent., but the area sown was greater by 5·8 per cent. *Oats.*—The total production in the specified countries, excluding British India and Japan, is placed at 262,308,000 qr. this year, against 225,574,000 qr. last year, an increase of 16·3 per cent., while the area sown was greater by 7·8 per cent. *Maize.*—The production in Spain, Italy, Switzerland, Canada, and United States is estimated to amount to 388,552,000 qr. in 1917, or an increase of 23·7 per cent. compared with 1916, when it amounted to 314,161,000 qr., the area sown showing an increase of 13·6 per cent.

France.—The report of the Ministry of Agriculture, dated 24th October, shows that all late crops, including maize and potatoes, have maintained their favourable position, as compared with the prospects at this time last year. In each case the condition is better than in October, 1916. (*Broomhall's Corn Trade News*, 2nd November, 1917.)

Italy.—According to the Bulletin of Agrarian Statistics the production of wheat in 1917 amounted to 3,800,000 tons as compared with 4,800,000 tons in 1916; rye, 113,000 tons against 136,000 tons; barley, 162,000 tons against 220,000 tons in 1916; and maize 2,125,000 tons against 2,471,000 tons, the average of the period 1909-1916.

Sweden.—According to a report, dated 12th October, received from H.M. Minister at Stockholm, the latest information regarding harvest prospects, which shows a slight improvement on previous reports, is as follows: Wheat, 2·4; barley, 2·8; oats, 2·8; winter rye, 2·0; spring rye, 2·5; and potatoes, 3·5 (5 = very good, 4 = good, 3 = moderate, 2 = small.)

The official estimated yields of the following crops are given as follows (1916 figures in brackets): Wheat, 937,000 qr. (1,121,000); barley, 1,471,000 qr. (1,755,000); oats, 7,450,000 qr. (9,805,000); and rye, 1,837,000 qr. (2,674,000). (*Broomhall's Corn Trade News*, 26th October, 1917.)

Uruguay.—According to a report, dated 6th September, received from H.M. Minister at Montevideo, the yield of wheat is officially estimated at 254,000 tons; oats, 45,000 tons; and flax, 6,000 tons. It is estimated that 150,000 tons of wheat will be available for export.

United States.—According to a report issued by the Statistical Bureau of the Department of Agriculture the preliminary estimate of the maize crop is 3,191,000,000 bush , compared with 2,583,000,000 bush last year , the potato crop totals 440,000,000 bush , against 285,000,000 bush , the final estimate last year , whilst the crop of flax seed is estimated at 9,648,000 bush , compared with 15,400,000 bush last year (*Broomhall's Corn Trade News*, November 9th, 1917)

South Africa.—The official Crop and Live Stock Report for July, 1917, issued by the Department of Agriculture at Pretoria, states that it is estimated that the area under wheat in the Union is 23 per cent. greater than last year, and the yield, which is expected to be a record one, is estimated at about 1,031,000 qr The area under barley is about 2 per cent greater than in 1916, and there is little change in the position as regards oats as compared with last year (*Board of Trade Journal*, 11th October, 1917)

Live Stock in Denmark.—According to a special census the numbers of live stock on the 12th July, 1917, were as follows (the numbers on the 15th July, 1914, being shown in brackets) Horses, 572,412 (567,240) , cattle, 2,458,158 (2,462,862) , sheep, 480,007 (514,908) , pigs, 1,650,623 (2,496,706) (*International Crop Report and Agricultural Statistics*, October, 1917)

Live Stock in France.—The numbers of farm stock on the 1st July, 1917, were as follows (the numbers on the 1st July, 1916, being shown in brackets) Horses, 2,282,560 (2,281,415), cattle, 12,443,304 (12,723,946), sheep, 10,586,594 (12,079,211) , pigs, 4,200,280 (4,448,366) (*International Crop Report and Agricultural Statistics*, October, 1917)

Agricultural Conditions in England and Wales on 1st November.

THE reports furnished by the Crop Reporters of the Board on agricultural conditions in England and Wales indicate that corn was generally secured in fair condition, being considerably better in the eastern half of the country than in the west, where there was more rain throughout the harvesting period In most parts wheat shows the best quality and oats the poorest

The total production of wheat in England and Wales in 1917 is estimated at 7,164,649 qr., or 330,000 qr more than last year; and the yield per acre, 29 88 bush., is 1¼ bush greater than in 1916, though 1½ bush below the average of the ten years, 1907-16 Although the yield per acre of barley (30·36 bush) is three-fourths of a bush. smaller than in 1916, the total production, 5,539,514 qr , is 360,000 qr greater, owing to the increased area under this crop The total production of oats, 10,866,765 qr , is 450,000 qr more than in 1916, and the largest crop since 1907 This large crop is due to the increased area, as the yield per acre (38·49 bush) is 1½ bush less than a year ago, and about the same amount below average Beans are a very poor crop, and the 436,310 qr returned represent the smallest crop recorded since 1885, both in total production and yield (17·16 bush) per acre‘ Peas are rather more satisfactory, and the total production, 276,895 qr , is slightly greater than last year, but still much below normal.

Over the greater portion of the country less threshing than usual has been done up to the present, owing especially in the west to the damp condition of the grain, while farmers generally have been anxious to push on with sowing.

In the most important potato-growing districts in the east the bulk of the crop has been raised, but the bad weather in the west has hindered this work very much, and considerable quantities are still in the ground. The quality generally is satisfactory; and except in the west and south-west there is little mention of disease, while even in those areas it appears to be less than was feared two months ago.

Lifting of mangolds, turnips and swedes is backward generally, the wet weather in the west again hindering the work. Mangolds are everywhere of satisfactory quality, but turnips are poor, particularly in the eastern half of the country.

Fair progress has been made with autumn cultivation in the chief corn-growing counties; in many parts October was fairly favourable, especially for light land, and a considerable breadth has been already sown with wheat and other autumn-sown grain. Some is already showing above ground and looks well. In many other districts, however, much less has been done, while in the western half of the country autumn cultivation is, owing to the unfavourable weather, backward.

Seeds are on the whole strong and vigorous (though rather poor in East Anglia). Some damage has been done by laid corn in the west.

Live stock have mostly done fairly well during October. Prospects for winter keep are satisfactory in most parts of the west, where roots and hay are larger crops than elsewhere, but on the eastern side, hay, straw and roots (apart from mangolds) are short. The yield of seeds' hay this year in England and Wales is estimated at 28·6 cwt. per acre, or nearly 1 cwt. below average; that of meadow hay at 21·48 cwt. per acre, or 1¼ cwt. below average. The total (2,405,468 tons of clover and seeds and 5,149,537 tons of meadow hay) is some 1,280,000 tons less than the large crop of last year, but nearly a million tons above the poor crop of 1915.

Labour is still scarce, especially the more skilled sorts, but the situation is certainly no worse, and probably rather better, than a year ago.

The following local summaries give further details regarding agricultural conditions in the different districts of England and Wales:—

Agricultural Labour in England and Wales during October.

Northumberland, Durham, Cumberland and Westmorland.—The supply of labour is deficient especially for the more difficult work.

Lancashire and Cheshire.—The supply of labour is short, but much help has been rendered in potato lifting by school children and women.

Yorkshire.—Skilled labourers, especially horsemen, are scarce, but otherwise the labour situation is not so bad as it was last autumn.

Shropshire and Stafford.—Labour is still very scarce, but with the assistance of soldiers and women the necessary work has been got through.

Derby, Nottingham, Leicester and Rutland.—Skilled labour is very scarce, but soldiers and women are assisting in good numbers.

Lincoln and Norfolk.—The supply of labour is deficient generally.

Suffolk, Cambridge and Huntingdon.—The supply of labour is deficient, though more perhaps in quality than quantity in many districts. Women have given good help with potato lifting, and they are being used for turnip pulling.

Bedford, Northampton and Warwick.—Although the supply of labour is deficient, work on the farms does not appear to be much in arrear, good assistance having been rendered by soldiers and women.

Buckingham, Oxford and Berkshire.—Labour is scarce, but the shortage is not being so acutely felt, now that most of the crops have been secured.

Worcester, Hereford and Gloucester.—Labour is everywhere short, but assistance is being given by soldiers and women.

Cornwall, Devon and Somerset.—The supply of labour is very short, and difficulty has been experienced in obtaining hands for the lifting of potatoes and roots. Soldiers and women are, however, giving valuable help.

Dorset, Wiltshire and Hampshire.—Labour is generally short, but soldiers, women and children have materially assisted with the lifting of potatoes and roots.

Surrey, Kent and Sussex.—Labour is on the whole still short, especially skilled labour. Much help has been given by soldiers, women and children.

Essex, Hertford and Middlesex.—Although the supply is deficient, the shortage has not been so keenly felt owing to the great assistance rendered by soldiers and women. German prisoners have also been assisting.

North Wales.—The supply of labour is deficient, especially in the case of temporary labour for potato and root lifting.

Mid-Wales.—Labour is still very scarce.

South Wales.—Labour is still deficient, especially as regards experienced men.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st November, 1917, certain diseases of animals existed in the countries specified :—

France (for the period 16th September—6th October).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders and Farcy, Rabies Sheep Scab, Swine Erysipelas, Swine Fever.

Holland (month of August).—Anthrax, Foot-rot, Glanders, Swine Erysipelas.

Italy (for the period 1st—7th October).—Anthrax, Black-leg, Foot-and-Mouth Disease (734 outbreaks), Glanders and Farcy, Sheep-scab, Swine Fever, Tuberculosis.

Norway (month of September).—Anthrax, Black-leg.

Russia (month of February).—Anthrax, Cattle-plague, Foot-and-Mouth Disease (10,344 animals), Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Fever, Swine Erysipelas.

Sweden (month of August).—Anthrax, Black-leg, Swine Erysipelas.

Switzerland (for the period 8th—14th October).—Anthrax, Black-leg, Swine Fever.

No further returns have been received in respect of the following countries : Austria, Belgium, Bulgaria, Denmark, Germany, Hungary, Montenegro, Rumania, Serbia, Spain.

The Weather in England during October.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 6th Oct.:								
England, N.E. ...	51·8	+0·5	0·38	10	− 5	3	5·5	+1·9
England, E.	53·0	+0·7	0·81	21	+ 8	4	6·1	+2·3
Midland Counties ...	51·2	+0·3	1·15	29	+15	4	5·7	+2·4
England, S.E. ...	53·7	+0·5	0·79	20	+ 2	4	6·0	+2·1
England, N.W. ...	51·9	+0·3	1·44	37	+16	5	4·4	+1·0
England, S.W. ...	53·4	+0·5	1·29	33	+ 9	5	4·8	+1·0
English Channel ...	56·8	+1·0	0·58	15	− 6	5	5·5	−1·1
Week ending 13th Oct.:								
England, N.E. ...	43·5	−5·9	1·33	34	+16	7	3·6	+0·3
England, E.	44·9	−5·7	1·35	34	+18	6	3·9	+0·2
Midland Counties ...	44·7	−4·6	1·31	33	+14	6	2·4	−0·7
England, S.E. ...	47·3	−4·5	1·47	37	+18	6	2·9	−0·8
England, N.W. ...	45·1	−5·0	2·07	53	+31	7	2·4	−0·6
England, S.W. ...	47·4	− 3·9	2·16	55	+28	7	2·3	−1·1
English Channel ...	51·8	−2·8	2·14	54	+12	7	2·1	−2·2
Week ending 20th Oct.:								
England, N.E. ...	44·7	−3·6	0·10	3	− 15	2	4·6	+1·7
England, E.	45·1	−4·3	0·69	18	+ 3	4	4·6	+1·4
Midland Counties ...	44·2	−3·7	0·33	8	− 9	3	3·8	+0·9
England, S.E. ...	46·3	−4·5	0·87	22	+ 3	4	4·7	+1·3
England, N.W. ...	45·6	−3·4	0·49	13	− 9	5	3·3	+0·6
England, S.W. ...	46·2	−4·3	0·77	20	− 5	4	3·8	+0·5
English Channel ...	50·3	−3·6	1·03	26	+ 3	5	4·7	+0·6
Week ending 27th Oct.:								
England, N.E. ...	44·0	−2·3	0·48	12	− 6	5	4·1	+1·5
England, E.	45·2	−1·9	0·31	8	− 8	3	5·7	+2·3
Midland Counties ...	44·4	−1·6	0·64	16	− 1	5	3·7	+1·2
England, S.E. ...	46·9	−1·6	0·46	12	−10	4	5·3	+2·2
England, N.W. ...	45·2	−1·6	1·49	38	+15	7	2·2	−0·4
England, S.W. ...	47·1	−1·4	1·04	26	− 1	6	3·8	+0·9
English Channel ...	50·5	−1·8	1·12	28	0	7	4·6	+1·2

* 1 inch = 2·54 millimetres.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of October, 1915, 1916, and 1917.

—	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
London ...	48	2	63	7	72	4	45	5	55	4	60	9	29	8	33	8	44	8
Norwich ...	45	4	57	9	71	2	42	8	52	6	59	6	27	8	31	1	43	3
Peterborough	46	4	60	3	70	6	43	11	53	11	56	7	27	7	31	8	43	1
Lincoln ...	46	8	60	1	70	10	43	6	53	9	58	11	27	11	30	7	44	6
Doncaster ...	46	0	59	2	70	0	41	4	51	9	56	0	26	11	31	2	41	2
Salisbury ...	46	8	60	11	72	11	41	2	54	10	59	3	27	5	31	2	52	9

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1915, 1916 and 1917.

Weeks ended (*in* 1917).		WHEAT.						BARLEY.						OATS.					
		1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
		s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan.	6...	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
,,	13...	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
,,	20...	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
,,	27...	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb.	3...	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
,,	10...	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
,,	17...	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
,,	24...	56	0	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar.	3...	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
,,	10...	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
,,	17...	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
,,	24...	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
,,	31...	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl.	7...	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
,,	14...	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
,,	21...	56	5	55	3	84	10	31	5	52	10	70	6	30	11	31	8	59	8
,,	28...	58	3	56	3	81	1	32	7	53	5	69	5	31	5	32	4	58	6
May	5...	60	5	55	7	77	7	33	3	53	1	64	4	32	4	32	10	54	9
,,	12...	61	7	55	5	78	0	34	0	53	5	64	11	32	5	33	1	55	2
,,	19...	62	0	55	0	77	11	34	1	52	10	64	10	32	8	33	0	55	2
,,	26...	61	11	54	7	78	0	34	8	52	9	64	9	32	7	33	4	54	11
June	2...	61	9	53	3	78	0	35	4	53	9	65	11	32	5	33	3	54	11
,,	9...	60	1	51	2	78	0	34	5	52	8	67	7	32	4	32	7	55	0
,,	16...	56	1	48	10	78	2	34	3	50	9	75	6	31	9	32	1	55	1
,,	23...	52	0	47	6	78	1	34	4	49	10	75	0	31	9	31	3	55	2
,,	30...	49	5	46	3	78	3	35	3	49	1	73	11	31	1	30	10	55	1
July	7...	50	1	46	3	78	1	34	7	45	6	69	5	31	6	30	8	55	2
,,	14...	52	7	48	11	78	2	35	8	47	5	70	10	31	6	31	6	55	1
,,	21...	53	10	51	6	78	3	35	10	48	8	72	1	32	1	32	3	55	2
,,	28...	55	3	53	5	78	3	36	1	47	2	65	7	31	1	32	5	55	2
Aug.	4...	55	4	55	1	78	2	35	7	46	1	73	6	31	5	32	9	55	0
,,	11...	55	2	56	7	78	4	37	0	46	11	76	1	31	7	31	2	55	0
,,	18...	54	3	58	1	78	7	39	4	48	0	68	11	31	4	30	8	55	6
,,	25...	51	11	59	0	76	7	38	3	47	1	70	7	30	0	31	6	54	7
Sept.	1...	45	3	59	4	72	1	38	1	48	5	60	4	26	10	30	5	49	0
,,	8...	43	0	59	3	71	6	37	11	51	7	59	3	26	8	31	1	46	7
,,	15...	42	9	59	11	70	7	39	0	52	6	57	2	26	4	30	9	45	0
,,	22...	43	3	59	4	70	8	39	8	53	3	56	10	26	1	30	9	45	8
,,	29...	43	5	58	10	70	6	40	4	54	1	58	5	26	5	31	1	44	7
Oct.	6...	44	1	59	2	70	8	41	0	54	5	57	9	26	5	30	9	44	9
,,	13...	45	9	59	7	71	0	42	3	53	10	58	5	27	1	31	6	44	5
,,	20...	48	2	60	9	70	8	44	0	53	8	59	3	28	1	31	11	44	1
,,	27...	50	3	62	10	70	10	46	2	54	6	60	1	29	1	32	10	43	0
Nov.	3...	51	6	66	7	70	4	47	3	56	2	59	11	30	4	34	0	42	4
,,	10...	52	8	69	8	70	3	47	5	58	0	60	2	30	11	35	8	42	11
,,	17...	53	6	70	9	70	3	47	11	59	8	60	2	31	3	37	8	43	0
,,	24...	54	2	70	8			48	7	61	8			31	1	39	7		
Dec.	1...	53	7	71	3			48	11	63	1			30	11	41	4		
,,	8...	52	10	72	1			47	10	65	6			30	4	44	1		
,,	15...	53	11	73	2			47	5	66	5			30	6	45	10		
,,	22...	53	10	74	8			47	2	67	3			30	7	46	5		
,,	29...	54	9	75	10			47	5	67	5			30	10	47	4		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in October and September, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	OCTOBER.		SEPTEMBER.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK:—	per stone.*	per stone.*	per stone.*	per stone.*
Cattle:—	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Polled Scots	17 1	16 4	17 6	16 9
Herefords	16 10	15 9	17 1	15 11
Shorthorns	17 0	15 6	17 8	16 0
Devons	17 2	15 6	17 6	15 11
Welsh Runts	16 7	15 6	17 0	15 9
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	15⅛	13¾	15⅛	14
Sheep:—				
Downs	16¼	14¾	16⅛	15
Longwools	15¼	14¼	15¼	14¼
Cheviots	15⅛	14½	15⅜	14¼
Blackfaced	13⅛	13	13⅜	12¼
Welsh	14⅛	13⅛	14⅞	13⅝
Cross-breds	16	14½	16¼	14⅝
	per stone *	per stone.*	per stone.*	per stone.*
Pigs:—	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Bacon Pigs	19 4	18 6	18 0	17 3
Porkers	20 1	19 2	18 5	17 8
LEAN STOCK:—	per head.	per head.	per head	per head.
Milking Cows:—	£ *s.*	£ *s.*	£ *s.*	£ *s.*
Shorthorns—In Milk ..	46 19	36 7	45 5	35 8
„ —Calvers ...	43 11	34 14	42 8	34 4
Other Breeds—In Milk ...	45 11	34 17	41 1	33 18
„ —Calvers ...	—	27 0	29 0	25 0
Calves for Rearing	3 18	3 0	3 17	2 19
Store Cattle:—				
Shorthorns—Yearlings .	16 12	14 0	16 3	13 8
„ —Two-year-olds..	25 19	21 7	23 13	20 1
„ —Three-year-olds	34 3	28 9	31 12	26 16
Herefords —Two-year-olds.	29 10	24 4	28 14	23 1
Devons— „	25 14	22 13	25 2	22 8
Welsh Runts— „	25 0	21 19	23 6	20 7
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
Downs or Longwools ...	63 8	52 7	59 10	49 19
Store Pigs:—				
8 to 12 weeks old	37 4	28 1	35 8	27 3
12 to 16 „ „	63 2	49 9	58 10	47 1

* Estimated carcass weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in October, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF :—						
English	1st	116 6	114 0	—	115 6	115 6
	2nd	112 0	110 0	—	108 6	111 0
Cow and Bull	1st	105 0	109 6	98 0	100 0	100 0
	2nd	98 0	104 6	85 0	89 6	94 6
Irish: Port Killed	1st	112 0	112 0	114 0	114 0	113 0
	2nd	—	108 0	100 6	106 6	102 6
Argentine Frozen—						
Hind Quarters	1st	109 6	—	—	—	—
Fore ,, ...	1st	92 0	—	—	—	—
Argentine Chilled—						
Hind Quarters	1st	110 0	105 6	108 6	109 6	108 6
Fore ,, ...	1st	91 6	87 6	90 0	90 6	90 0
American Chilled—						
Hind Quarters	1st	106 0	106 0	107 6	108 0	107 6
Fore ,, ...	1st	87 6	88 6	88 6	88 0	88 6
VEAL :—						
British	1st	117 0	115 6	117 6	116 6	117 6
	2nd	112 0	93 6	93 6	98 0	105 0
Foreign...	1st	—	—	—	—	—
MUTTON :—						
Scotch	1st	121 6	120 6	121 6	121 6	121 6
	2nd	115 6	115 6	112 0	115 6	113 0
English...	1st	121 6	120 6	—	121 6	121 6
	2nd	115 6	115 6	—	115 6	113 0
Irish: Port Killed	1st	121 6	—	121 6	121 6	121 6
	2nd	115 6	—	112 0	115 6	113 0
Argentine Frozen	1st	107 6	107 6	107 0	107 6	107 0
New Zealand ,, ...	1st	86 6	—	86 6	87 6	86 6
Australian ,, ...	1st	—	—	—	—	—
LAMB :—						
British	1st	121 6	120 6	121 6	121 6	121 6
	2nd	115 6	115 6	112 0	—	113 0
New Zealand	1st	100 6	—	100 6	98 0	100 6
Australian	1st	100 6	100 6	100 6	98 0	100 6
Argentine	1st	107 6	—	107 6	107 6	107 6
PORK :—						
British	1st	133 0	—	133 0	133 0	—
	2nd	—	—	127 6	—	—
Frozen	1st	—	119 0	—	119 0	—

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in October, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British...	—	—	—	—	26 6	25 0
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
„ Factory	—	—	—	—	—	—
Danish...	—	—	—	—	—	—
French...	—	—	—	—	238 6	234 0
Dutch	—	—	—	—	—	—
Australian	—	—	—	—	209 0	206 0
New Zealand	—	—	—	—	227 0	224 0
Argentine	—	—	—	—	212 6	209 6
CHEESE ;—						
British—						
Cheddar	143 6	—	—	—	145 0	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	153 6	152 6	154 6	—
			per cwt.	per cwt.	per cwt.	per cwt.
Canadian	130 6	—	130 6	—	130 6	—
BACON ;—						
Irish (Green)	173 0	—	—	—	167 0	165 0
Canadian (Green sides)	—	—	162 0	—	162 0	—
HAMS :—						
York (Dried or Smoked)	—	—	—	—	200 0	194 0
Irish (Dried or Smoked)	—	—	—	—	190 0	—
American (Green) (long cut)	137 0	—	137 0	—	137 0	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British...	—	—	—	—	35 7	33 9
Irish	32 5	—	32 6	30 5	33 5	31 10
Danish	—	—	—	—	33 0	31 0
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
British Queen ...	151 6	141 6	136 6	126 6	146 6	136 6
Edward VII.	155 6	148 0	138 6	131 6	146 6	136 6
Up-to-Date	156 6	150 0	151 6	146 0	—	—
HAY :—						
Clover	—	—	150 0	140 0	143 6	137 0
Meadow	—	—	—	—	143 6	137 0

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	OCTOBER.		TEN MONTHS ENDED OCTOBER.	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	15	42	363	442
Animals attacked	19	48	415	519
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	24
Glanders (including Farcy):—				
Outbreaks... . ..	1	2	25	43
Animals attacked	10	10	46	111
Parasitic Mange:—				
Outbreaks	74	59	2,039	1,817
Animals attacked	112	115	3,873	4,065
Sheep-Scab:—				
Outbreaks	16	8	420	203
Swine Fever:—				
Outbreaks	95	228	1,888	3,764
Swine slaughtered as diseased or exposed to infection	36	121	818	8,889

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	OCTOBER.		TEN MONTHS ENDED OCTOBER.	
	1917	1916.	1917.	1916.
Anthrax:—				
Outbreaks	—	—	3	3
Animals attacked	—	—	5	7
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	—
Parasitic Mange:—				
Outbreaks	1	4	41	58
Sheep-Scab:—				
Outbreaks	31	33	323	350
Swine Fever:—				
Outbreaks	6	18	191	274
Swine slaughtered as diseased or exposed to infection	28	99	1,107	1,580

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THE NEW SEED TESTING STATION
AND THE
TESTING OF SEEDS ORDER.

THE vital needs of Food Production have brought about an advance in the application of Science to Agriculture, which informed opinion has long demanded. That there has been hitherto no official control of seeds in England and Wales is, perhaps, characteristic, though it was decided by the Board before the outbreak of war that an Official Seed Testing Station was desirable, and it was agreed that one should be organised.

It is equally characteristic of our war methods that the control now being established will possibly be more complete than that in any other country. Some serious failures of spring wheat crops last season were traced to the sowing of misdescribed seed, and similar disappointments in some vegetable and other crops were clearly to be attributed to the use of old seed with a very low percentage of germination. It is, however, easy to observe more than these specific reasons for the issue of the Testing of Seeds Order. The tendency of recent official control of farmers' supplies has been in three main directions: (*a*) increase and assurance of output; (*b*) regulation and fixing of prices; and (*c*) compulsory disclosure of quality. Of the three, the last promises to be of the most permanent value; the first may be abandoned altogether, when we return to something like normal conditions; and the second is likely to survive only in a semi-official form, perhaps by way of periodical voluntary agreement between official bodies and representative associations of traders.

Compulsory disclosure of quality has hitherto obtained chiefly in the fertiliser trades. The recent Compound

Fertilisers Order, issued by the Ministry of Munitions at the request of the three Agricultural Departments of the United Kingdom, provides for so advanced a measure of disclosure as to constituents and unit values that the farmer can for the first time appraise the value of a compound manure with something like accuracy. This policy of *letting the farmer know what he is buying by compelling the seller to disclose essential facts* is also at the root of the Testing of Seeds Order, printed at p. 1031. Its outstanding features are that the seller is obliged to state on his invoice the variety of the seed, the percentages of purity and germination (in the case of cereals, variety only), and the nature and quantity of certain dangerous impurities. It applies only to the more important "food production" seeds, it exempts sales of small quantities from the declaration, and while it comes into force on 1st January, 1918, its application is delayed in part for six months.

Sellers are free to make their declaration on the results of private or official tests, but the test of one of the three official stations is the decisive evidence in case of dispute.

On 14th November last, the Right Hon. R. E. Prothero, M.P., President of the Board, formally opened the new Seed Testing Station for England and Wales at 70, Victoria Street, London, S.W. 1., and made the following remarks :—

> "We have met here to-day to declare open an Institute which we hope has got in it the seeds of great expansion. We all of us know that a great deal of inferior seed used to find its way to the farmer. We also know that during the War the use of inferior seed has sometimes in many places increased, and that, owing perhaps to the closing of some of the Agricultural Colleges, or at least the reduction of their staff, and the employment of the agricultural organisers on other work, there has been less seed testing than usual. Now, we are all of us interested in food production. It is a matter of national importance, and I think we shall all agree that good seed, which is what it purports to be and has the minimum of impurity, is one of the most important requisites for that increased food production, and we all know, roughly speaking, what the defects of seed are. There is generally an admixture of noxious weeds, of old seed, and of foreign seed which is generally useless, and what we have got to do is to secure to the farmer a supply of seed which is what he believes it to be—seed which is pure and of good quality so far as germinating power is concerned. We want him to be

protected against sowing the weeds which will foul his land, and we want him to be protected from sowing parasites which will destroy his standing crops. How can we do it ? Well, we are at war, and whatever means we create must be suited to a war emergency measure. We have got to test the seed. We have got to control the supply. We must reserve all questions over which we might be divided, and we must carry out our plan as economically as possible, both in respect of man-power and money. After prolonged conferences we believe we have evolved such a scheme, and I should like to say this, that we are immensely grateful to the experts like Professor Biffen and Mr. Stapledon and others for their services. We are also grateful to the seed dealers and merchants of this country who have given in a most ungrudging way the benefit of their skill and experience, and have helped us most loyally to make this scheme a success. I can assure them on our part that we fully realise the extra strain we are putting on them just at the moment when their clerical assistance is at its lowest, and that we shall administer this Order in the spirit in which it has been framed.

Now, you all know better than I do that England has been very slow in creating such a station as this. It has been wanted for years. The Continent has had it, and for the last forty years or more there have been in existence Government stations created by the Continental Governments or taken over by them. Ireland some sixteen years ago started its Seed Testing Station. It had to have an Act of Parliament, and it has certain powers. Then some six years ago came Scotland, and Scotland's Testing Station is a voluntary establishment. Our scheme applies to both Scotland and Ireland. It is not only brought in with their approval and support, but they also mean to use the powers under the Order. England at last takes up the question and takes it up during a time of war, and we cannot hope to perfect the Institute in all those ways in which I expect it will develop after the War is over.

At the present moment we are in this extraordinary position. England is the greatest seed-broking centre of the world, and we have English merchants selling English seed to foreign countries with a foreign certificate as to quality. This is an extraordinary anomaly. We look forward to the time when a certificate will come from this Institute, which we are now going to open, which will carry English seed and the guarantee of its purity throughout the world. As to the question whether the Irish and Scottish method of seed testing is better than the Continental, that we have settled by one of those characteristic compromises which a practical man generally hits upon—that during the War we will not raise the question. We will adopt the Irish and Scottish method and leave the question over. As to the question of the economy of man-power and money, I think you will agree with me—when I say that we expect to spend a sum of £500 on equipment, that we have secured the services of Mr. Stapledon as Director, one of the first men on questions of seed that this country can produce, that we have got two trained assistants and the whole clerical staff which is required, and that we do not anticipate spending more than £1,100 per annum—that we have carried out our scheme with every regard both to money and to man-power.

That was what I wanted to say to you about the immediate purpose of the Institute. I believe it has in it a seed which will grow, and will prove of inestimable value to agriculture in the future, and that we shall have in time to come an Institute of Applied Botany which will be of great assistance to our agricultural brethren. I have pleasure in declaring this Seed Testing Station open."

Sir Ailwyn Fellowes said :—

" I propose a vote of thanks to our President. We all admire him and have the greatest confidence in the work that he is doing on behalf of agriculture in this country. I am perfectly certain of this, that one of the best things that he could do is to open this new Station, which will be of the greatest help to agriculturists in the country."

Captain Sir Charles Bathurst said :—

" I second this vote of thanks with the greatest pleasure. It has taken in these, as in many other respects, the trials of a terrible war to introduce that agricultural activity which has been so long lacking in this country. However, better late than never. In regard to the clover seeds, we have been obtaining a large proportion from the Central Powers with every impurity imaginable. The time has come when, in view of our intention in future

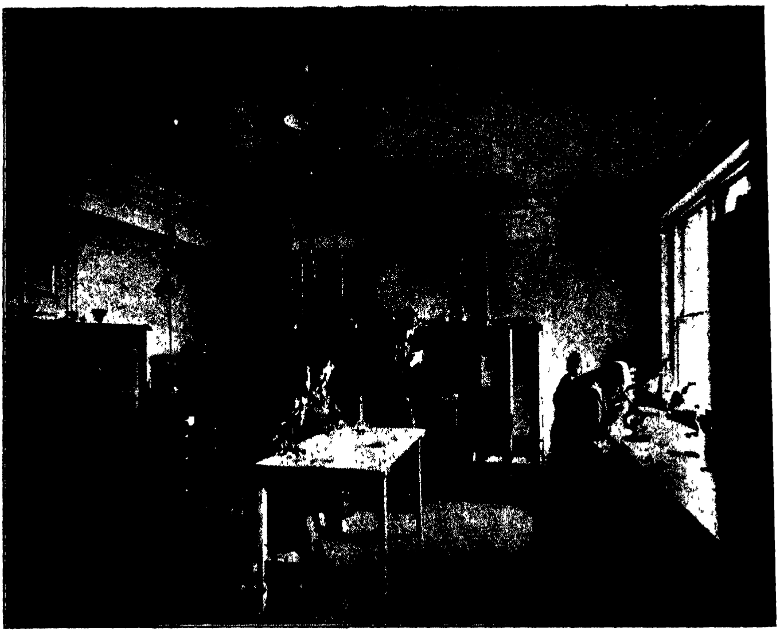

FIG. 1.—The Official Seed Testing Station: The main Laboratory showing some of the Germinators

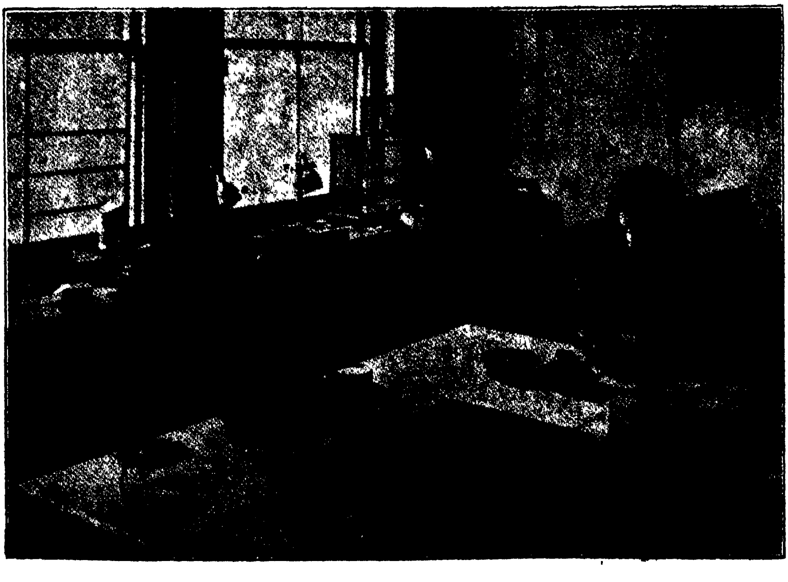

FIG 2. -The Official Seed Testing Station: Girls picking out germinated seeds. (This photograph kindly lent by the Editor of the *Agricultural Gazette*.)

to depend far more upon our own resources, we shall obtain our seeds not only from our own country but with such a guarantee as this Seed Testing Station will provide.

I heartily second the vote of thanks proposed by Sir Ailwyn Fellowes."

The *President* said in reply :—

"I should like, if I may to mention one name among those who have helped to start this, and that is the name of Mr. Lawrence Weaver. I am sure that his tact and perseverance and tenacity of purpose have carried him over a great many difficulties, and I am confident that all the seed merchants who met at those Conferences over which he presided would wish me to express their thanks to him as well as my own for his great services in connection with this Institute."

The nature of the characteristic compromise between the exclusive use of the "Irish" or "Continental" systems of testing to which the President referred is indicated by the following extract from the minutes of the conference between twelve representatives of Government Departments and Universities and twenty-one representatives of the Seed Trade of the United Kingdom (the Director of Supplies of the Food Production Department in the Chair) when the final draft of the Testing of Seeds Order was discussed :—

> *The Chairman* called on each representative member of the Seed Trade to give his view as to which was the preferable system to be adopted in testing seeds at the English Station. It was thus ascertained that three were for the Irish method, eleven for the Continental, while three were neutral. He then called on Mr. J. R. Campbell (of the Irish Department) and Dr. Greig (of the Scottish Board) to give their reasons for believing that the Irish system should be adopted.
>
> *Mr. Campbell* stated that there was some misunderstanding as to the difference between the two methods of testing. He said that actually the Irish method produced the cleaner sample and that as a farmer looked more at germination than at anything else the Continental method would mislead him. He reminded the meeting that it was only a question of four grasses, and that to the seedsman who cleaned his seed well, it would not matter which method was used. He concluded by saying that in Ireland seeds were tested in accordance with an Act of Parliament, and that any change of system for them was impossible ; that they had used the method for sixteen years and found it satisfactory, and that he was very anxious for uniformity between the three Kingdoms.
>
> *Dr. Greig* stated that this question had been carefully considered in Scotland before the adoption of the Irish system, and although they had no Act of Parliament it would be equally

impossible for them to change, even if they wanted to, but that so far he had heard no argument which convinced him that the Continental method was the better. He did not regard as important the argument that Scotland and Ireland were alone against the rest of the world in this matter, but hoped that in time the whole Continent would unite with them in using the Irish method. If the Continental method were adopted at the English station it would make it very difficult for the English dealer to trade in Scotland; and, as it would only be a temporary measure, and great advantages would be felt from the unity of the three Kingdoms, he urged the trade to consider the question from a patriotic point of view and give the system a trial.

The Chairman urged the importance of considering the matter from a food-production point of view, He then made a definite proposal to the Conference, namely, that for the period during which the present Order should remain in force, which would extend approximately from the 1st January, 1918, to a date six months after the close of hostilities, the "Irish system" of testing should be adopted at the English station, provided (1) that grass-seeds for export should on request be tested at all three official stations by the Continental system, and (2), that the whole question of the method of testing be reconsidered at a conference to be summoned by the President of the Board of Agriculture and Fisheries before any steps are taken to issue a further Order He then called on Mr. Arthur W. Sutton (Messrs. Sutton & Sons, Reading), Mr. J. E. N. Sherwood (Messrs. Hurst & Son), and Mr. F. A. Gardiner (Messrs. James Carter & Co.) to state whether they were satisfied with his suggestion.

Mr. Sutton stated that, though he had a distinct preference for the Continental system, he was prefectly willing to accept the Irish system in view of the absolute necessity of having a uniform system for England, Scotland and Ireland, and in order to fall into line with the strong wish expressed by the Irish representatives.

Me. Sherwood supported the view stated by Mr. Sutton.

Mr. Gardiner was quite prepared to accept the suggestion made by the Chairman if it was certain that they might have their own seeds tested for export and import in the Continental way.

The Chairman said that the undertaking to test in the Continental way must be subject to the three Government stations giving precedence to the testing of "food production" seeds for home use.

It is of interest to report that the new Seed Testing Station is not only open but hard at work, that many seed firms are taking full advantage of its services, and that many samples are being forwarded for test by farmers, who are charged only 3*d*. (threepence) per test. An explanatory leaflet, in which is incorporated the text of the Order, is in preparation, and will shortly be ready for distribution. It will probably appear in the January issue of this *Journal*.

ACCREDITED FARMS AND STATE FARM MANAGEMENT CONTEST IN THE UNITED STATES.

A. W. ASHBY.

Accredited Farms.—At the State College of Agriculture, University of Wisconsin, no student is allowed to take a degree in agriculture equal to M.A. or M.Sc. unless he has previously secured two years' experience of farming on a farm " farmed for business." Many, perhaps most, of the students have had this experience before entering the college, but at least some students arrive at the senior year without any such experience. To meet the needs of these students a system of examining farms, their management, and financial results, and awarding certificates of good management, was established some years ago. To the farms which have been awarded such certificates the attention of such students is directed, and if they make a personal arrangement with the farmers, the students go to one or more of these farms for the purpose of gaining experience of actual farming and farm life for the period required before their diploma will be presented.

The farmer who submits his farm and his farm accounts to this examination has two reasons for so doing. In the first place, if his farm is " accredited," he is often able to get a fairly cheap or at least plentiful supply of labour. In the second place, the honour of being recognised as a good and successful farmer is to him of considerable importance.

The method of examining farms is to send a competent agriculturist to make an inventory of the stock, etc., at the beginning of the agricultural year. Notes of the standing crops, or conditions of the fields, and the general system of farming are also made. The farm is then visited several times during the important periods of the year. At the end of the year another inventory and valuation is made, and accounts are received and analysed. If it then becomes clear that the farm is managed on a fairly good system, which returns a reasonable profit, a certificate is granted and the farm becomes " accredited." The position then is that the farmer has received something equivalent to a university degree for practical work done for himself (and incidentally for society) on his own farm.

The system of examination is not necessarily continuous, though it is so in some cases by the request of the farmer. In the case of evident deterioration of the farm the certificate may be discontinued or withdrawn.

It is naturally to these farms that the scientific agricultural advisers of the State turn, when questions affecting agriculture in their neighbourhood crop up. Often the farmers themselves are anxious to obtain advice, or to try new methods, and practical experiments are frequently made on these farms. Indeed, the scientific agriculturists of the State College of Agriculture say that the co-operation of farmer and teacher in work connected with these farms is of great advantage to the teacher as well as to the farmer.

University Honours for Practical Farmers.—In addition to this system of "accredited farms" the University of Wisconsin inaugurated, about six years ago, a system of honorary recognition of farmers who have rendered distinctive service to their profession or to their localities. Twenty-one farmers have since been honoured, of whom only three have been "college men." The others have perhaps been men of little academic training, but men who have assisted in the improvement of agricultural methods. Some have studied and improved rotations, while others have improved seed stocks, or selected and improved cattle for definite purposes. In 1915 three men were granted honorary degrees and they were, respectively, a sheep breeder, a horse and cattle improver, and a pioneer of fruit farming in the State.

When the honours are granted ceremonies are followed as for graduations: the eight hundred students of the College of Agriculture are called together in the presence of the President of the University and Board of Regents, but the honours of the men of the soil are not buried in a mass of other honours, as they are the only candidates present.

The Farm Management Contest.—During recent years an annual "State Farm Management Contest" has been held, and in 1914 the writer saw a good deal of the work in connection with the contest for that year, and also a large number of the competing farms. The financial inducement to enter the contest was small, for the first prize amounted to only 100 dollars and the second to 50 dollars, with the addition of six prizes of 25 dollars each, but 150 farmers entered the contest. The contest was limited on this occasion to 10 districts, comprising 11 counties, as the area to which the contest is open is varied from year to year.

The contest differs chiefly from Prize Farm Competitions in this country in a definite score-card being adopted and a close scrutiny being made of financial results. The score-card adopted is as follows :—

	Points.
Managerial income	50
Maintenance of fertility..	20
Home life	20
Health of herd	5
General appearance	5
	100

A few observations on the general methods of procedure and the method of using the score-card may be useful.

The judges consisted of two practical farmers, with the addition of the Instructor in Farm Management of the College of Agriculture, who was responsible for the large amount of clerical work involved.

The "managerial income" is determined by making an inventory at the beginning and end of the year, and by reference to financial records. Many, if not most, of the farms were owned by occupiers, and the "managerial income" is the sum remaining from the net proceeds of the financial transactions after 5 per cent. interest on all capital employed has been deducted.

The "maintenance of fertility" is examined with reference to crops sold and fertilisers bought, or the growing of crops, such as maize for silage, clover, etc., for food for stock, the aim being to stimulate the development of a system of farming which will maintain or increase soil fertility. This item may also cover the examination of the fields for the removal of surface water, etc.

"Home life" may appear to English farmers as a curious item on this score-card, but as interpreted in the circumstances is justifiable. In the first place most of the "help," *i.e.*, farm labour, consists of young men lodged on the farm. To retain such help it is necessary to make the men comfortable. Further, to induce farmers' sons to remain in the industry it is necessary that they shall not be made merely drudges, and that they shall be interested in the problems of the farm. Thus this item may cover some inquiries as to whether farm labour stays on the farm for a reasonable period, and what agricultural journals are taken for the instruction of the young men on the farm. It also covers inquiries as to provision of proper water supplies and labour-saving machinery for the use of the house. It may also cover the preservation of the decency and cleanliness of the house from contact with the farm.

TABLE I.—UNIVERSITY OF WISCONSIN COLLEGE OF AGRICULTURE.

FARM MANAGEMENT CONTEST: COUNTY No. 1.

Factors that Make for Success in Farming.

1913	Record of Farm No. —	Average for the County: 8 Farms.	Average for the State.		
			Total 150 Farms.	Best 10 Farms.	Poorest 10 Farms.
1. Managerial income ..	$4,791.35	$1,659,68	$1,272.73	$5,394.45	—$ 716.55*
Size of Business—					
Capital.					
2. Total capital	$46,893	40 ,491.75	$23,087.55	$40,325.10	$25,091.04
3. Operating capital ..	$22,323	$16,766.13	$5,541.06	$12,489.15	$5,475.50
4. Per cent. operating capital	47.81	41.4	24	30.97	21.81
Crops—					
5. Total acres	163	172.43	165.42	189.55	185.5
6. Acres in crops ..	113.5	91.21	98.72	128.25	111.44
7. Acres in pasture ..	46	56.38	44.78	53.27	53.61
Livestock—					
8. No. of horses	8	6.12	5.21	6.4	5.7
9. No. of cows	29.5	36.31	17.58	36	11.6
10. No. of ewes	—	—	20.39	23.00	20.75
11. No. of brood sows ..	2 5	2.5	6.65	11.64	6.55
Labour—					
12. No. of men	3	5.33	2.57	3.43	2.41
Receipts—					
13. Total receipts ..	$10,118.70	$9,026.17	$4,124.34	$10,260.76	$2,288.44
Diversity of Business—					
14. Receipts from crops ..	$1,116.10	$513.35	$955.65	$1,598.12	$564.21
Per cent. of total ..	11.03	5.6	23.17	15.57	24.65
15. Receipts from sale of livestock	$5,206.00	2,784.49	$1,480.21	$4,408.61	$1,084.82
Per cent. of total ..	51.44	30.84	35.88	43 84	47.40
16. Receipts from livestock products	$3,792.60	$5,467.09	$1,501.64	$3,676.46	$598.29
Per cent. of total ..	37.48	60.57	36.41	35.83	26.14
17. Miscellaneous receipts	$4.00	$298.53	$186.84	$609.37	$68.50
Per cent. of total ..	0.5	2.89	4.28	4.75	1.8
Production—					
Grain.					
18. Barley .. .. acres	—	17.5	14.84	19.33	24.4
Yield per acre.. bush.	—	20.15	27.28	61.03	19.2
19. Corn† for grain.. acres	12	—	—	—	—
Yield per acre.. bush.	42.	42.3	49.92	56.02	40.88
20. Oats .. .. acres	21.5	24.15	22.08	19.75	17.5
Yield per acre.. bush.	43	40.86	41.5	50.90	46.2
Roughage.					
21. Alfalfa .. .. acres	18.0	15.07	‡(58) 11.07	‡(7) 29.42	‡(2) 4
Yield per acre.. tons	2.5	2.8	2.9	3.25	3.75
22. Other hay .. acres	35	30.84	24.41	17.8	28.1
Yield per acre.. tons	1.5	2.16	2.9	2.29	2.93
23. Corn silage .. acres	22	49.62	15.98	23.87	15.6
Yield per acre.. tons	10.2	9.83	10.6	11.71	9.1
Livestock.					
24. Receipts per horse ..	—	$6.96	$ 2.78	$18.93	— $3.78*
25. Receipts per cow: milk and cream sold ..	$123.55	$132.89	$69.82	$97.42	$42.24
26. Receipts per cow: sale of livestock ..	$150.17	$92.61	$50.13	$123.41	$36.45
27. Receipts per ewe ..	—	—	3.26	‖(1) 5.76	‖(4) 3.44
28. Receipts per sow ..	$75.60	$25.60	$101.80	$82.31	$96.50
29. Crop acres per man ..	32.4	23 22	40 32	36.84	41.64
30. Animal units per man	16.6	11.91	14.51	17.54	13.42
31. Crop acres per horse ..	14.2	16.56	19.3	20.39	19.79
32. No. of animal units ..	58.15	58.33	33.78	62.18	42.85

* Figures preceded by minus sign (—) indicate estimated losses

† In these tables "corn" refers to maize.

‡ Number of farms on which alfalfa (lucerne) was grown.

‖ Number of farms on which ewes were kept

TABLE II.—UNIVERSITY OF WISCONSIN COLLEGE OF AGRICULTURE.

FARM MANAGEMENT CONTEST: COUNTIES Nos. 2 and 3.

Factors that Make for Success in Farming.

1913.	Record of Farm No. —	Average for the 2 Counties: 11 farms.	Average for the State.		
			Total 150 Farms.	Best 10 Farms.	Poorest 10 Farms.
1. Managerial income ..	$3,522.01	$684.01	$1,272.73	$5,394.45	— $716.55*
Size of Business—					
Capital.					
2. Total capital	$27,355.50	$31,705.91	$23,087.55	$40,325.10	$25,091.04
3. Operating capital ..	$9,105.50	$6,806.14	$5,541.06	$12,489.15	$5,473.50
4. Per cent. operating capital	33.29	22.09	24	30.97	21.81
Crops—					
5. Total acres	146	177.2	165.42	189.55	185.5
6. Acres in crops	122	121	98.72	128.95	111.44
7. Acres in pasture ..	14	45.61	44.73	53.27	53.61
Livestock—					
8. No. of horses . ..	6	7.04	5.21	6.4	5.7
9. No. of cows	20.5	16.72	17.58	36	11.6
10. No. of ewes	—	‖(1) 2.5	‖(34) 20.39	‖(1) 23	‖(4) 20.75
11. No. of brood sows ..	2.5	6.68	6.65	11.64	6.55
Labour—					
12. No. of men	2.9	2.52	2.57	3.43	2.41
Receipts—					
13. Total receipts .	$7,420.46	$4,082.93	$4,124.34	$20,260.76	$2,288.44
Diversity of Business—					
14. Receipts from crops ..	$1,900.77	$1,152.55	$955.65	$1,598.12	$564.21
Per cent. of total ..	25.61	28.22	23.17	15.57	24.65
15. Receipts from sale of livestock	$3,668.20	$1,446.17	$1,480.21	$4,408.61	$1,084.82
Per cent. of total ..	49.43	35.42	35.08	43.84	47.40
16. Receipts from livestock products	$1 710.49	$1,380.05	$1,501.64	$3,676.46	$598.29
Per cent. of total ..	23.05	33.80	36.41	35.83	26.14
17. Miscellaneous receipts	$141 00	$143.22	$186.84	$609.37	$68.50
Per cent. of total ..	1.91	2.55	4.28	4.75	1.8
Production—					
Grain.					
18. Barley .. . acres	—	28 7	14.84	19.33	24.4
Yield per acre . bush.	—	24.31	27.28	61.03	9.2
19. Corn† for grain acres	37	29.29	16.65	34.22	23.9
Yield per acre .. bush.	70	48 72	49.92	56.02	40.88
20. Oats .. . acres	12	18.65	22.08	10.75	17.5
Yield per acre bush	60	45.30	41.5	50.90	46.2
Roughage.					
21. Alfalfa .. .. acres	—	‡(5) 9.3	‡(58) 11.07	‡(7) 29.42	‡(2) 4
Yield per acre . tons	—	4.2	2.9	3.25	3.75
22. Other hay .. acres	20	29.1	24.41	17.8	28.1
Yield per acre .. tons	2.25	1.85	2.9	2.29	2.93
23. Corn silage .. acres	17	17.35	15.98	23.87	15.6
Yield per acre tons	63.5	11.2	10.6	11.71	9.1
Livestock.					
24. Receipts per horse	— $25.00*	— $5.05*	$2.78	$18.99	— $3.78*
25. Receipts per cow: milk and cream sold ..	$76 61	$57.02	$69.82	$97.42	42.24
26. Receipts per cow: sale of livestock	$172.19	$44.79	$50.13	$123.41	$36.45
27. Receipts per ewe .	—	—	‖(34) $3.26	‖(1) $5.76	‖(4) $3.44
28. Receipts per sow ..	$144.88	$117.01	$101.80	$82.31	$96.50
29. Crop acres per man ..	42.00	48.36	40.52	36.84	41.64
30. Animal units per man	13.5	19.59	14.51	17.54	13.42
31. Crop acres per horse	20.3	17.50	19.3	20.39	19.79
32. No. of animal units ..	39.35	47.30	33.78	62.18	42.85

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* Figures preceded by minus sign (—) indicate estimated losses.

† In these tables "corn" refers to maize.

‡ Number of farms on which alfalfa (lucerne) was grown.

‖ Number of farms on which ewes were kept.

The "health of herd" covers the general provision for health of whatever kind of stock is kept, especially in the stalls, and, in the case of dairy cattle, any special care taken with regard to tuberculosis.

"General appearance" covers the tidy and general business-like appearance of the farm.

The farms are inspected several times during the year, and most farms receive two or three visits from the whole of the judges, and in some cases special visits may be paid by one or more judges.

After the judging is completed, and all financial records have been examined, each competitor is supplied with a sheet similar to the sheets appended, comparing the work on his farm with general results. Also each competitor is invited to a conference in some central town in the district to which the competition has been open, when the factors which have made for success are discussed. Here competitors compare notes, not so much for competitive purposes, as with a view to improving methods of profitable farm practice. From these contests have sprung many experiments with new methods. The items of the score-card, especially the comparison of financial results and the examination of methods of maintaining fertility, show the strength and weakness of systems or farming in a given district. They also enable the County Organisers to get in touch with good farmers and successful practice in their respective areas, and sometimes lead to demonstrations of practice of use to farmers in the locality.

Some of the record sheets of the 1913–14 Contest are here appended. At the conclusion of the Competitors' Conference, 1914, a number of farmers paid collective visits to some of the competing farms. The guide sheets for these visits in two counties are also appended.

POINTS OF INTEREST ON FARMS VISITED.

La Crosse County.

Farm No. 1. West Salem, Wis.—100 head registered Guernsey cattle; new dairy barn—remodelled old barn; listed corn field.

Farm No. 2. West Salem, Wis—Pure bred and grade Guernsey cattle; Chester white hogs.

Farm No. 3 West Salem, Wis—Registered Guernsey cattle; new model dairy barn.

Farm No. 4. West Salem, Wis.—Pure bred and grade Guernsey cattle; alfalfa.

Farm No. 5. West Salem, Wis.—Registered and grade Guernsey cattle; farm crop cultivation.

Farm No. 6. West Salem, Wis.—Chester white hogs; Belgian stallions; model farm home.

Farm No. 7. West Salem, Wis.—Registered Jersey cattle; remodelled farm barn; farm cropping system.

Farm No. 8 West Salem, Wis—Registered Guernsey cattle; alfalfa; Duroc-Jersey swine.

Farm No. 9. Holmen, Wis.—Guernsey cattle; farm buildings; milking machine.

Farm No. 10. Holmen, Wis.—Guernsey cattle; Belgian horses.

" 11. Holmen, Wis.—Guernsey cattle; farm poultry.

" 12. Holmen, Wis.—Intensive cultivation—alfalfa and corn.

Waukesha County.

Farm No. 1. Waukesha, Wis.—Guernsey cattle; re-modelled cow barn.

Farm No. 2. Waukesha, Wis.—Guernsey cattle; re-modelled cow barn.

Farm No. 3 Waukesha, Wis.—Hot water heating; electric lights; electric washing machine; electric iron; vacuum cleaner.

Farm No. 4. Waukesha, Wis.—Holstein cattle; a convenient barn; farm water system; convenient farm home; furnace heating; convenient kitchen.

Farm No 5. Waukesha, Wis—Pure bred Guernseys; re-modelled dairy barn.

Farm No. 6. Waukesha, Wis.—Pure bred Guernsey cattle; re-modelled dairy barn; re-modelled house; the use of acetylene gas.

Farm No. 7. Waukesha, Wis.—Guernsey cattle; certified milk plant; drainage of marsh soil; new farm house; Kewaundee water system; hot and cold, soft water throughout the house; separate house for farm help; electric lighting system.

Farm No. 8. Waukesha, Wis—Re-modelled farm house; hot and cold, hard and soft water; air pressure water system; acetylene lighting system.

Farm No 9. Waukesha, Wis.—Guernsey cattle; possibilities with grade cows; sanitary milk plant; Percheron stallion; air pressure water system; re-modelled farm house; provision and arrangements for farm help.

Farm No. 10. Waukesha, Wis.—Guernsey cattle; certified milk plant; provisions and arrangements for farm help.

Farm No. 11. Waukesha, Wis.—Grade dairy cattle; sanitary dairy barn; certified milk plant; model house for farm help.

Farm No. 12. Waukesha, Wis.—Grade dairy cattle; certified milk plant.

THE MARKET-GARDEN DISTRICT OF BIGGLESWADE, BEDFORDSHIRE.[*]

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Part II.—MANURING.

Some Effects on Soil of Long-continued Dressings of London Dung.—Certain parts of the market-garden district of Biggleswade have been cultivated intensively for many decades, and in some cases even for centuries. They are, therefore, particularly suitable for ascertaining whether such a system of cultivation tends to accumulate or exhaust the supplies of plant food in the soil.

Unfortunately, at the time when the land was turned into market-gardens, no analyses of the soil were made, and hence it is not possible to establish a direct comparison of its condition before and after manurial treatment; but on the same formations there are still alongside the market-gardens other fields which have been left down to pasture throughout the period, and which may be taken to be representative of the condition of the market-garden soil when it was brought under

TABLE I.—*Analyses of Soils showing some Effects of Long-continued Dressings of London Dung.*

—	Old Gravels, Biggleswade Plateau.		New Dark Gravels, Holme Green.		Brown Gravels, Biggleswade Common.	
	Market Garden.	Pasture.	Market Garden.	Pasture.	Market Garden.	Pasture.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Moisture ..	1·45	1·02	1·95	·87	1·10	2·07
Organic Matter ..	5·08	7·80	6·76	9·62	3·65	8·11
Nitrogen ..	·155	Not determined	·227	·361	·127	·308
Calcium Carbonate	·08	·11	·43	·16	·04	·07
Potash, K_2O—						
Total soluble[†]	·27	·33	·43	·33	·26	·23
"Available"[‡]	·036	·009	·024	·010	·036	·016
Phosphoric acid, P_2O_5—						
Total soluble ..	·24	·15	·37	·27	·25	·20
"Available" ..	·09	·013	·18	·06	·06	·01
Total soluble, less "Available"	·15	·14	·19	·21	·19	·19

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[*] Part I. appeared in this *Journal* for November, 1917, p. 834.

[†] Soluble in hydrochloric acid. [‡] Soluble in 1 per cent. citric acid.

cultivation. In Table I. are set out the analyses of three such pairs of soils taken from three distinct soil formations.

A remarkable fact is revealed by the table, *i.e.*, that in spite of the continuous and heavy manuring on the market-garden soil, the organic matter and the nitrogen content are much lower than in the pasture soils. The percentage of potash soluble in hydrochloric acid, though somewhat irregular, remains about the same in any two soils from the same formation, and variations are to be ascribed to slight differences in the amount of clay present, but the potash soluble in citric acid (" available " potash) is decidedly higher in the market-garden soils than in the pasture soils. In the case of the phosphoric acid content, the effect of the manuring becomes very apparent; in each example the market-garden soil is considerably richer than the pasture soil, both in total soluble phosphoric acid and in " available " phosphoric acid, and especially in the latter. Further, this difference can be shown to be due to the manuring, for as the original phosphoric acid content on any formation is constant under natural conditions, and all phosphoric acid added in the form of manure would be "available," after subtraction of the " available " from the total soluble phosphoric acid, the pairs of samples should agree. This has been done in the table and a close agreement is obtained in each case.

The difference between the " available " phosphoric acid in the two samples from Holme Green represents an accumulation of 2,400 lb. of phosphoric acid per acre, equivalent to the amount contained in 270 tons of London dung.

According to Dyer* fresh London dung contains 0·39 per cent. of phosphoric acid and 0.51 per cent. of potash (*i.e.*, a dressing 20 tons per acre would contain 175 lb. of phosphoric acid and 224 lb. of potash), and it is remarkable that, although dung is richer in potash than in phosphoric acid, there is very little storage of potash compared with the storage of phosphoric acid. The explanation lies in the fact that most market-garden crops remove more potash than phosphoric acid from the soil. For instance, 6 tons of potatoes remove 24·2 lb. of phosphoric acid and 77 lb. of potash†; 20 tons of carrots contain 41 lb. of phosphoric acid and 145 lb. of potash‡; white turnips, onions and parsnips contain also about three times as much potash as phosphoric acid. Thus, whilst the potash in 20 tons of dung would be about sufficient for a crop of potatoes or carrots, at least 100 lb. of phosphoric acid would be left over. Under the system of manuring which prevails in the Biggleswade district, with its almost exclusive use of London dung, it is clear that small dressings of potash manures would prove most profitable.

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* *The Journal of Agricultural Science*, Vol. I. p. 101, 1907.

† P. McConnell, *An Agricultural Note-Book*, p. 156, 1910.

‡ *Journal, Royal Agricultural Society of England*, Vol. 13, 1st. Series, p. 458.

Green Manuring.—At the present time the market-gardener of the Biggleswade district depends chiefly upon London dung to maintain the fertility of his soil, huge quantities of 30 to 40 tons per acre being commonly used. Supplies of London dung, however, are becoming less abundant every year, and it is obvious that in the near future the market-gardeners will have to find a substitute. Owing to the coarse sandy nature of the soils of the district, their content of organic matter must always be maintained at a very high level, otherwise the soils dry out in periods of low rainfall, cake hard on the surface, and lose that mellowness which is absolutely necessary if a good stand of seedlings is to be obtained from such small seeds as carrot and parsnip.

The most satisfactory substitute for the organic part of the London dung probably consists in green manuring. The green manuring crops commonly used are clover, tares, mustard, rape and, for market-gardens, white turnips—a valuable crop in preparing land for potatoes. Clover is commonly used on the larger farms where a market-garden crop is introduced once or twice in the ordinary farm rotation. The clover seed is sown in a cereal crop in the usual way, one cut being taken the following July and the second growth turned in in October.

When supplemented by artificial manures, this form of manuring has been very successful with potatoes on the old brown soil formation. Mustard, rape, and tares used as green manure have been the subject of a series of experiments carried out at the Woburn Experimental Station. On soil very similar to the brown and Greensand soils in the Biggleswade district, a cereal crop always followed the green soiling, and better yields of corn were invariably obtained after mustard than after tares or rape. This result was the more surprising as the quantities of green substance and nitrogen ploughed under were greater in the case of tares than in that of mustard.

	Mustard. *lb. per acre.*	*Tares.* *lb. per acre.*
Weight of green crop (1st cut, 1902) ..	6,888	8,463
Nitrogen	27·5	60·1

One grower (Mr. Gray) has investigated the effect of ploughing-in various crops on the yield of the subsequent potato crop. He has kindly supplied the figures given below

	Early Potatoes. (*Average for* 20 *Years.*) *Tons*	*cwt.*	*Late Potatoes.* (*Average for* 20 *Years.*) *Tons*	*cwt.*
No green manure ..	2	4	5	2
White turnips ..	3	12	6	19½
Mustard	3	3	6	4
Tares	3	1½	6	9½
Rape	2	18	6	0½
Trifolium	3	1*	6	16†

* Average for 4 yeaıs. † Average for 7 years.

Under ordinary farming conditions in England, turnips are rarely used as green-soiling crops. Love states‡ that turnip-tops are commonly ploughed in as green manure in Scotland and that turnips themselves are sometimes crushed with a clod-crusher and turned in, a crop of 18 tons of turnips to the acre being expected to increase the following corn crop by 24 bush. and 32 bush. in the case of barley and oats respectively. Market-gardeners of the Biggleswade district prefer white turnips to both mustard and rape as a soiling crop, because, although from analyses (see Table II.) mustard should be a richer manure than either turnips or rape (as it contains a much higher percentage of organic matter and nitrogen), it has the marked disadvantage of containing hard, woody stems which only decay slowly when ploughed under and therefore tend to open up the soil to the drying effects of the air. The market-gardeners speak of mustard as a "heating" crop suitable for use only on loams, and not on coarse sandy soils. White turnips, on the other hand, are considered to be a "cooling" crop and to bind the sand togetheı.

The Bedfordshire custom is to market smaller turnips in the autumn and to leave the larger ones in the ground till December, when tops are usually cut off and allowed to wilt, whilst the roots are sliced up and ploughed under, together with some London dung. Used in this way the crop has a further advantage in that it absorbs the nitrates formed during a period of active nitrification in the autumn, and thus their loss from the soil through drainage is prevented. White turnips, however, are not satisfactory where the land is being prepared for Brussels sprouts or cabbages, for when cruciferous crops are grown in succession the second is very liable to be

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‡ *Journal, Royal Agricultural Society of England*, Vol. IV., p. 99, 1868.

TABLE II.—*Percentage Composition of Green-soiling Crops at Various Stages of their Growth.*

—	Turnips.						Mustard		Rape		
	Small		Medium		Large		Medium	Large	Small	Medium	Large.
	Leaves	Bulb	Leaves	Bulb	Leaves	Bulb					
Water	89·32	92·58	90·39	93·14	90·54	92 95	86·28	84·92	90·08	91·08	90·02
Organic matter	8·53	6 86	7·51	6·36	7·50	6·47	11·83	13·19	8·37	7·41	8·40
Nitrogen	·40	·110	·381	·126	·321	·147	·537	427	·392	·372	·413
Ash..	2·15	·56	2·10	·50	1·96	·58	1·89	1·89	1·55	1·51	1·58
P_2O_5	—	—	·14	·07	—	—	·12	—	—	·13	—
K_2O	—	—	·50	·30	—	—	·61	—	—	·67	—
CaO	—	—	·27	·04	—	—	·49	—	—	·25	—
MgO	—	—	·05	·02	—	—	·06	—	—	·04	—

attacked by finger-and-toe, unless a good dressing of lime or of artificial manures is applied. Potatoes, on the other hand, do exceptionally well on ground which has been green-soiled with white turnips.

The analyses given in Table II. were made on samples taken from the crops at different stages of their growth, and conclusions may be drawn from the figures as to when it is most profitable to plough in the crop. Turnips and rape increase their nitrogen content as they grow older and should, therefore, be allowed to become as large as possible before being ploughed in; mustard, on the other hand, contains more nitrogen when half-grown than when full-grown, and, as the older crop has the added disadvantage of being hard and woody, it is probably more profitable to turn the crop under at an early stage.

ECONOMY IN THE FEEDING OF DAIRY COWS.*

THE object of this article is to supply information and suggestions to dairy farmers and cow-keepers on the subject of making the most economical use of such supplies of home-grown and purchased feeding stuffs as they may have at their disposal.

The present shortage and high price of concentrated foods, such as cake, grain and meal, are facts which of themselves make for economy in the use of these foods, but it should be clearly recognised by all farmers that the practice of rigid economy must be extended to the use of the common home-grown foods such as roots, hay and straw. Mere considerations of self-interest alone should be sufficient to ensure this, since the cost of home-grown foods consumed generally forms quite one-third of the total cost of milk production.

The first step towards economy is the fixing of definite weights of the different kinds of food to be given daily or weekly to the various sections of the dairy herd. When these rations have been decided on according to the supplies of the different foods and the needs of dry cows and cows yielding different quantities of milk, they should be written out and displayed in a prominent place in the food store or cowshed, and the farmer or manager should see to it that the instructions thus given are followed as closely as possible.

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* Printed as Food Production Leaflet No. 25.

Where it has not been customary to fix on definite rations, the necessity for adoption of this practice should be explained to the cowman, so that his assistance may be secured in obtaining the best results both in the utilisation of food and the maintenance of the milk yield.

Roots.—While 40 to 50 lb. roots per head per day may be suggested as the most satisfactory quantity to give to cows in milk, local conditions on many farms may make it desirable or necessary to give larger or smaller daily allowances. Where roots are abundant and other foods limited the allowance may be increased to 70 or 80 lb. daily, but the latter amount should be regarded as the maximum. No experiments or investigations have shown beneficial results from heavier feeding, and under the conditions at present obtaining it would be better practice to reserve any surplus of mangolds, at any rate, for use in the summer of 1918, in view of the prospect of a diminished acreage of pasture

Where the supply of roots is limited, the daily allowance should be reduced in proportion. It will as a rule be cheaper to give 25 lb. home-grown roots daily through the winter than to give 50 lb. daily for the first three months and have to purchase roots or other substitutes at a high price later in the season.

In some parts of the country no roots are fed to dairy cows, but most farmers consider the supply of some succulent food to be desirable. When no roots are available a supply must be purchased or suitable substitutes must be used. The purchase of roots often leads to expensive feeding, but a small quantity daily adds variety to the ration and promotes digestion. Other crops, such as rape, hardy green turnips and varieties of kale, are useful substitutes, but, as these foods cannot be stored, the method of feeding may involve considerable outdoor labour during the winter; they can be most profitably utilised when and where the land is sufficiently dry to allow them to be fed in the fields.

Silage.—This food has frequently been advocated as a substitute for roots, and its value in this respect depends on the crops from which it is made, the method of storage, and the relative conditions of cropping and cost. It may be an economical substitute on heavy soils and in districts where the root crop is uncertain. Recently, silage has been made successfully in wooden or concrete silos from mixed cereal and leguminous crops, such as oats and vetches, and oats, vetches and beans or similar mixtures. This silage is superior (about 1½ times) in feeding value to roots because it consists partly of leguminous plants rich in protein, and it may be used to displace the whole, or more generally a part, of the roots and hay in winter rations. Up to 56 lb. per head daily has been fed with satisfactory results, but 25 to 35 lb. is a more usual allowance.

Wet Grains.—This food very largely takes the place of roots in the rations of cows in town and suburban dairies, and under the present conditions of supply is not likely to be used in excess. Farmers with sufficient roots to allow 40 lb. per head daily have no need for wet grains in addition, and the practice occasionally followed of feeding 60 to 80 lb. roots, together with 20 to 30 lb. wet grains, is wasteful and should be avoided.

Fodders: Hay and Straw.—The daily allowance of fodder may be made up of hay alone, hay and straw, or straw alone. Where hay is plentiful the daily allowance is often from 20 to 30 lb., and when this is given the ration of cake and meal should be somewhat reduced. At the same time, it is very necessary to make sure that free use of hay does not lead to wastage. The practice of feeding hay in unlimited and unknown quantities is much too common on dairy farms, and, while constituting bad management even in normal times, its continuation under the present conditions is most undesirable on national grounds. It is a simple matter to have all hay trussed and to allow a fixed number of trusses daily or weekly to a given number of cows; by this method careful and economical use can be assured, and it may be a great advantage to carry a reserve to the winter of 1918–19. Meadow hay and oat straw are the commonest fodders in use, and the daily quantity should usually range from 15 to 20 lb., the proportion of each varying according to the supply. The complete substitution of hay by straw can be achieved most satisfactorily on farms with good supplies of oat straw, but when no hay is given the allowance of concentrates should be somewhat increased, to keep up the proportion of protein in the ration. Pea and bean straw, when in good condition, should also be made full use of, and the best results will be obtained if they are chopped and mixed with roots and other fodder, or with treacle-water and meals, to make the mixtures more appetising. The palatability of the mixture will be improved if it is allowed to heat a little by preparing it a day in advance. Badly-weathered or coarse hay and straw may be more fully utilised by similar treatment.

Where the utmost economy in fodder is desirable, no long hay or straw need be fed; the total allowance of fodder may be chopped, mixed and fed with cut roots, etc., with satisfactory results, provided that there is a sufficient bulk, and that not too much is given at a time.

Concentrates.—Cakes, Meals, and Grains.—Under the conditions of supply and distribution likely to prevail during the winter and spring, farmers in many cases will have to use such foods as they can obtain, rather than those they desire or to which they have been accustomed.

Home-grown Foods.—No restrictions are at present imposed on the use of oats, beans or peas for dairy cows; but it is clearly in the national interest that the use of these foods should be reduced to the narrowest limits, except in the case of material that is obviously unfit for human consumption.

Purchased Foods.—Millers' offal and brewers' and distillers' by-products will continue to be available in reduced quantities, and the same may be said of palm kernel cake and meal, linseed cake, undecorticated cotton cake, compound cakes and meals, and maize by-products; but many other well-known foods will only very rarely be on the market, if at all.

System of Feeding.

On many dairy farms the feeding is done in a most unbusinesslike manner. No definite ration is selected; the same quantity is given to a cow in full milk as to another nearly dry, and the farmer has no idea of the actual amounts of the different foods consumed daily. The investigations into the cost of food in the production of milk carried out in different parts of the country have brought to light many instances of extravagant and wasteful feeding, and have, in some cases, led to considerable improvement. Errors in feeding and management, however, which were not of material import before the War, may now lead to serious loss both to the nation and to the individual, and the adoption of a system of feeding which combines economy with efficiency is an imperative necessity.

In order to secure this end, cows should be fed according to a definite system, which takes into account the requirements of the animal when dry, and when yielding different quantities of milk.

The daily ration should be looked on as consisting of two parts :—

(*a*) The "*Maintenance*" part, required simply for the upkeep of the animal's body without producing milk or any increase in live weight.

(*b*) The "*Production*" part, required for the manufacture of milk or for any increase in live weight.

It is never the intention in ordinary farm practice to keep cattle at a fixed live weight or in a state of non-production, hence the ration given is never limited to strict maintenance needs, but as the requirements for maintenance of mature cows of similar live weight are practically the same whether the animals are dry or in full milk, the amount necessary for "maintenance" forms a convenient basis to which the "production" part of the diet may be added.

The food requirements of cows under different conditions have been carefully studied and "feeding standards" drawn up. The rations given later are designed to comply with the "standards," but it must be borne in mind that such rations can only serve for general guidance, since cows differ so much individually in their response to feeding. Personal attention alone on the part of the farmer can secure that the ration is properly adapted to the needs of the individual animals.

The chief products of the dairy cow are calves and milk, and it will be nceessary to consider separately the requirements of dry in-calf cows and of cows yielding different quantities of milk.

Dry In-Calf Cows.—Dry cows in calf should be fed with a view to preparing them for the work of the next lactation period, and while it is far from desirable to have such cows really fat, it will not be true economy so to stint them that they are in poor condition at calving time. This is particularly true of heavy milkers, and unless these have reserves of flesh and fat to fall back upon at calving time during the ensuing two or three months they will be handicapped in their production both as regards quantity and quality of milk.

Various rations suitable for the dry in-calf cow, weighing about 11 cwt., are given in the following table. The quantities of roots, hay and straw should be reduced or increased slightly for cows below or above the live weight stated.

Rations Suitable for Dry In-Calf Cows.

Foods	Mixture.					
	A	B	C	D	E	F
	lb.	lb.	lb.	lb.	lb.	lb
Roots	40	—	40	40	40	56
Hay (meadow)	15	21	—	10	10	—
Straw (oat)	8	—	20	8	8	20
Bean meal or maize gluten feed	—	—	3½	1	—	—
Oats or bran	—	—	—	1	—	—
Coconut cake or palm nut cake	—	—	—	—	2	—
Decorticated cotton cake or soya bean cake or linseed cake	—	—	—	—	—	2

As a guide to altering the above rations, 10–12 lb. of roots, 6–8 lb. of oat and vetch silage, 2½ lb. of hay, and 4 lb. of oat straw may be regarded as interchangeable quantities.

In any dairy herd there will always be one or more cows which have the productive tendency very strongly developed, or which for some other reason are difficult to dry off and get into reasonable condition before the next calving. Such cows require special attention, and when they are in poor flesh should be given an extra 2–3 lb. of cake or meal, or extra hay, daily.

Cows in Milk.—Cows in milk require the same amount of food for maintenance as dry cows, but the production part of the ration given in addition to the maintenance part should vary according to the milk yield

In practice the maintenance part of the ration is best supplied in the form of the home-grown roots and fodders, and the production part of the ration in the form of cake, meal or grain. The roots and fodder allowance can be made fairly uniform for all cows—say 50 lb. roots 10 lb. hay, and 10 lb. straw—and the cake, etc., then varied according to the yield. On the average each gallon of milk will require about 2 lb. of the richer cakes or 2–4 lb. of mixed cake, meals and grain, according to the composition of the foods used. The cows need not be fed individually, but can be divided into groups according to their milk yield. The adoption of this system ensures that each cow gets not only enough total food, but sufficient of the various food constituents—protein, carbo-hydrates, etc.—to meet both the maintenance and production requirements, *i.e.*, to make a properly-balanced ration.

The following tables give examples of suitable and adequate rations (*a*) for the maintenance of cows of about 11 cwt. live weight, and (*b*) for production per gallon of milk. From these mixtures rations can be built up for herds under different conditions according to the supplies of home-grown and purchased foods available.

Maintenance Mixtures for Cows of 1,200 lb. Live Weight (10¾ cwt.).

Foods	Mixtures						
	A	B	C	D	E	F	G
	lb	lb	lb	lb	lb	lb	lb
Roots	40	60	80	—	25	56	80
Hay (meadow)	10	8	5	15	12	—	—
Straw (oat)	8	7	14	—	—	21	21
*Bean or pea meal, maize gluten feed, palm kernel cake or meal, coconut cake, undecorticated cotton cake	—	—	—	—	—	—	1
*Decorticated cotton cake or meal, soya cake or meal, ground nut cake, linseed cake	—	—	—	—	—	1	—

* The above quantities should be reduced or increased slightly for cows below or above the live weight stated

Production Mixtures for One Gallon of Milk (to be added to any of the above Maintenance Mixtures).

Foods	Mixtures							
	I	II	III	IV	V	VI	VII	VIII.
	lb	lb	lb	lb	lb	lb	lb	lb
*Oats or dried grains or malt culms, bran, undecorticated cotton cake	1½	1	—	—	—	4	1½	—
*Bean or pea meal or maize gluten feed, coconut (copra) cake or palm kernel cake or meal, undecorticated ground nut cake	2	—	2	1	—	—	—	3
*Decorticated cotton cake or meal, soya cake or meal, decorticated ground nut cake, linseed cake, sesame cake	—	1	½	¾	1	—	1	—
*Maize or maize germ meal or middlings	—	1	—	1	2	—	—	—

* The foods bracketed together above may be regarded as equivalent and interchangeable.

On farms which have a plentiful supply of hay and roots, the latter should be used for the production of the first gallon of milk. For this purpose 8–10 lb. of hay, or 6–7 lb. of hay + 25–30 lb. of roots may be given. Where wet brewers' grains are available they may be substituted for roots in the proportion roughly of 1 lb. brewers' grains to 2 lb. roots.

The following illustration shows how the above tables may be used :—

Ration for a 3-gal. cow—

Take say *Maintenance Mixture B.*	60 lb. roots. 8 „ hay. 7 „ straw.
and *Production Mixture III.* 2 lb. × 3 gal. =	6 „ bean meal or other food in same group.
1½ lb. × 3 gal. =	1½ lb. decorticated cotton cake or other food in same group.

The list of fixtures given in the tables are only intended to illustrate some of the combinations which may be made, and are not necessarily more valuable for milk production than mixtures selected by the farmer himself from the foods most readily and cheaply obtainable (see Food Production Leaflet No. 13, *Comparative Money Values of Feeding Stuffs*).

In dairies where it is desired to fatten cows during their milking period, an allowance of foods rich in carbohydrates will be necessary over and above the requirements for milk production.

With the above variety of mixtures as a guide, it should be possible for a farmer to make up an economical ration from the foods at his disposal. Thus, on a farm with an average supply of roots, hay and straw, maintenance mixtures A or B may form the basis of the ration ; on a grass farm with an ample supply of hay, mixtures D or E may be most suitable ; and on a farm with plenty of straw and roots, mixtures F and G may be adopted. The production part of the ration must be made up from the foods available, and the mixtures given indicate the proportions in which the different foods may be combined to give a properly-balanced ration for milk production.

If the average milk yield of a herd during winter is assumed to be 2 gal. daily, the average amount of cake, meal, etc., required will vary from 4 to 7 lb. per head, according to the supplies of home-grown foods and the kinds of concentrates available. Farmers who have formerly used heavier rations are urged to reconsider their methods and to try the system outlined in the foregoing pages. It has been adopted in recent years by many progressive and successful milk producers with gratifying results; further, it should be remembered that a saving of 2 lb. of cake per head daily throughout a winter period not only economises the national stock, but reduces the cost of feeding by approximately £3 per cow.

CALF REARING.*

THE object of the present article is to give a summary of methods of calf-rearing which have proved successful in different parts of the country. In matters of detail a wide range of variation is found in the practice of different districts, but these differences turn mainly upon the extent to which whole milk or separated milk enters into the dietary, the variations ranging from the unrestricted use of milk on the one hand to the practical exclusion of milk on the other.

The particular method adopted depends largely upon the system of farming practised. In upland districts where plenty of cheap grass is available, or in non-dairying districts generally where the grass is of good quality and winter keep can be grown cheaply, or in the rearing of the highest class pedigree dairy stock, milk is fed liberally to the calf. On milk-selling and cheese-making farms, on the other hand, strict economy must be exercised in the use of milk for calf-rearing, whilst the butter-making farm occupies an intermediate position between these two extremes in that, although whole milk cannot be used freely, a plentiful supply of skimmed or separated milk or butter-milk is usually available for calf-rearing.

Before proceeding to describe the various methods of calf-rearing the question of the housing and care of the calf in early life may be dealt with briefly.

The Calf-House.—The essential requirements that the calf-house should fulfil are that it should be light, warm and airy and should afford reasonable provision for exercise. No stereotyped set of buildings is required. If the existing buildings are not quite suitable a little adaptation will usually suffice. A cement floor, however suitable from the sanitary point of view is too cold unless covered with several inches of peat moss or straw litter. A floor formed of either bricks, or earth, or rammed chalk is preferable. As a useful example, the calf-house on a north-country farm, where calves have been reared with considerable success for many years, may be described.

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* Leaflet No. 142 as recently re-written.

This is a spacious "lean-to" building on the south side of a higher one, and is lighted by means of single panes of glass at regular intervals in the roof. The floor is of concrete, with no drains either open or covered. The two doors, each in halves, are on the same side, so that there may not be cross-draughts. The pens (6 ft. by 5 ft.) are on each side of a central gangway with board partitions not quite down to the floor, and palings in front, so that the calves may see each other across the gangway. Each pen contains a small trough and hay-rack.

Before a new-born calf is placed in its pen the floor is littered with about an inch of well-broken moss-litter, and this is covered with a fair bedding of straw. A little extra straw is added day by day as required, and at the end of a week the pen is cleaned out. Afterwards, moss-litter only is used, a bucketful being scattered on the top as frequently as appears to be necessary, the pens being cleaned out about once in three weeks. Moss-litter is such a good absorbent and deodorant that no offensive odour is noticeable. When removed from the calf-pens it is still too dry to place on the manure heap, but it forms an excellent substance to place round the heap to absorb the liquid drainings; when saturated it is thrown on the top.

It will thus be seen that provision is made for comfortable and dry beds, sunlight, and fresh air, while an incentive is given to exercise on the part of the calves by the sense of companionship which they feel in seeing one another. These conditions are not difficult of attainment, and might well be aimed at in the construction of every calf-house.

The New-Born Calf.—There should be a plentiful supply of clean straw immediately behind the cow for the reception of the calf at birth. As soon as the calf is "dropped" it should be removed to its pen and the navel cord rubbed at once with an antiseptic as a precaution against the ingress of disease-producing bacteria at that part. A lump of "bluestone" (copper sulphate) is commonly used for the purpose, and has the added advantage of causing the cord to shrivel up quickly. If a fluid antiseptic be preferred a mixture of 1 part of Calvert's No. 4 carbolic acid with 19 parts of Gallipoli oil will serve the purpose. It is essential, however, that the cord shall be dried up within the first day or two.

The calf should now be thoroughly rubbed down with wisps of straw and allowed to lie covered over with straw till its mother has been milked.

Feeding the Young Calf.—*Suckling.*—If the calf is strong and is to be suckled, as in the case of pedigree animals, very little special attention need be given. In a comparatively short time the animal will get on its feet and begin to suck.

Hand-feeding.—If the animal is to be hand-fed, some rearers allow the calf to be with the cow for two or three days, whilst others regard it as best for the calf to be removed at once and hand-fed from the start. In the natural way, the calf would not suck the cow until it got well on its feet, and in mild or warm weather there need be no hurry, for half an hour or so, to give it its first meal when separated from the cow; but in cold weather it is important that the calf should have a drink of warm milk as soon as possible. In all cases milk should be given to the young calves at the blood-heat of the cow (101° to 102° F.) which is the temperature at which a calf would get it from the cow by sucking. To ensure this temperature it will usually be necessary to warm the milk, either by the addition of a little hot water or otherwise. It may be well here to give a special caution against serving milk too hot either at this stage or later; it is better to err on the side of not having it warm enough than of having it too hot. To induce the calf to drink, the two forefingers should be placed in the calf's mouth, and the head lowered into a bowl of the colostrum. Usually the calf at once sucks vigorously, but sometimes a little patience is required before it discovers its ability to suck. A quart is ample for the first meal; most calves readily take this amount, and many would take more if allowed. On the third day the use of the fingers may be discontinued and the calf made to drink from a small pail, and by this time it will take greedily two quarts at each meal.

The milk given to the calf at the outset should be the first drawn milk—colostrum or biestings—of the mother, since this possesses special nutritive and laxative properties which are essential for the well-being of the calf and difficult to supply in any other form. The mother's milk retains this character for the first week or so, throughout which period, however, it steadily approximates more and more closely to ordinary milk.

It sometimes happens, however, that a newly-calved cow is sold a day or two after calving, or a calf a day or two old is purchased, or a cow dies at calving, and no colostrum is available for the calf; in such a case a useful substitute for the first three days is made by whipping up an egg with half a pint of warm water, adding half a teaspoonful of castor oil, and stirring in one pint of new milk, for each meal.

After the preliminary difficulties have been overcome the calf should be fed at regular hours three times daily on whole milk until it is at least a fortnight old, by which time it can profitably consume 4 to 6 quarts per day. The subsequent feeding will vary according to the conditions as will be indicated later.

A word is necessary as to the proper treatment of purchased young calves brought from a distance, often under very trying conditions. Such animals are usually thirsty on arrival, and the natural tendency is to give a good meal at once. This is a great mistake and is probably largely responsible for the scour to which purchased calves are so subject. The methods adopted by successful rearers vary greatly; one of the best is to give a small dose of castor oil and some stimulant in a little warm milk, as soon as the calf arrives, and after an hour or so to give a small meal of milk, which should not be too rich. For the first few days the calf should continue to receive very small quantities of food at a time, though it should be fed as frequently as possible, and at least four times a day. If the least sign of scour appears a dose of castor oil should be administered at once, the quantity of food reduced by one-half and a little chalk or lime-water given. It is, indeed, a good plan in any case to leave a lump of chalk in the calf house, so that the calves can lick it as they like.

Before passing on to deal with different methods of rearing, a word of caution, which is generally applicable throughout the rearing, may be given as to the importance of regularity in the times of feeding and in the quantity and quality of the food supplied.

For the first eight weeks the food should be given in at least three meals per day. At all times changes in the amount or character of the feeding should be introduced gradually. A sharp look-out should be kept for lice and ring-worm, which are easily dealt with if taken in time. The more scrupulous attention paid to details such as these doubtless accounts for the common experience that the small farmer, whose wife or family looks after the calves, is so often more successful in rearing than the large farmer who is mainly dependent upon more or less careless hired labour. No information derived from experiments or otherwise will ensure the best calves being reared unless it is accompanied by that watchful eye which is absolutely essential in the attendant.

METHODS OF REARING.

A.—Liberal Use of Whole Milk.

At any time rearing ordinary commercial stock on whole milk is a costly process ; in these times, with restricted supplies of milk available for human consumption, it is neither profitable nor patriotic to give much of it to calves. The feeding of whole milk in considerable quantity to calves is at present only justifiable, if at all—

- (*a*) On somewhat inaccessible farms where milk-selling is impossible and where facilities for making butter or cheese do not exist.
- (*b*) Where milkers cannot be obtained and recourse must be had to suckling.
- (*c*) In the rearing of valuable pedigree stock

1. **Unrestricted Suckling.**—On upland farms in the South of Scotland and North of England, where plenty of cheap grass is available, cows are often allowed to rear their own calves entirely Such a method obviously saves labour, but is profitable only when the stock are of first-class quality and can be kept throughout the year at little expense, or when the sale of milk and its products is not the primary consideration. Galloway cows are crossed with a white Shorthorn bull with the object of producing blue-grey calves about the month of April. The calves run out at grass with their dams and are weaned about the end of October ; afterwards the cows remain out of doors till Christmas, or even throughout the winter if provided with some form of shelter.

In other cases Angus cows are housed and calved down in sheltered yards and turned out to grass with their calves in spring, while in districts where the grass is of somewhat better quality cows or heifers, of Shorthorn breeding crossed with an Angus bull will rear their own and another calf in the course of the summer.

Calves thus reared are admirably adapted for the production of "baby beef," and usually command top prices when sold either as weaned calves or as stores or butcher beasts at from one to two years old.

B.—Restricted Use of Whole Milk.

Although it is found by experience to be undesirable, if not practically impossible, to eliminate whole milk entirely in the rearing of calves, it is a very common practice to restrict its use to the first few weeks of the calf's life, and to replace it subsequently by cheaper materials, the nature of which varies according to the character of the farm and the supplies available. Generally speaking, some new milk will be given throughout at least the first four weeks. On butter-making farms the whole milk will by the end of that time be replaced by separated or skim milk, to which is added an oil or meal preparation, which is devised to serve as a cream substitute. On milk-selling and cheese-making farms, however, when whole milk feeding ceases, recourse must be had entirely to meal mixtures which are made up for feeding with water or with whey. It will thus be convenient to deal separately with these different cases.

1. *Butter-making Farms.*

Where butter is made, skimmed or separated milk or butter milk is usually available for calf-rearing, and, in the absence of whole milk, there is no better basis for a calf-food. Hand-skimmed milk and butter milk contain more fat than separated milk, and have been used alone for calf-rearing more or less successfully.

The essential difference between whole milk and separated milk is that the latter has been almost entirely deprived of its cream or butter-fat. In other respects the two are practically identical. In using separated milk, therefore, the aim obviously should be to replace as much as possible of the fat removed by another fat possessing similar properties. Various meals, however, are also used as cream substitutes.

Separated Milk and Oils.—Cod-liver oil is the most commonly used for this purpose, but linseed oil has been used when cheap enough, and satisfactory results have also been obtained with a form of dripping obtainable from large slaughter-houses.

Cod-liver oil is usually much cheaper than milk-fat; it would appear to be easily digested, and the calf very soon becomes accustomed to its taste. It is necessary, however, to see that the oil is perfectly wholesome. Only the best commercial oil of a clear amber colour should be used. In experiments at Garforth deaths occurred amongst calves receiving a low-grade oil, whilst there were no deaths amongst calves receiving a better oil.

In using the oil a tablespoonful is measured into a calf bucket, and the warm separated milk for one meal poured on to it; the mixture is poured into another bucket so as to mix or emulsify the oil, and is at once served to the calf. A calf thus gets three tablespoonfuls (say 2 oz.) a day, or half this quantity during the second fortnight, while having part new and part separated milk. If desired, double this quantity, *i.e.*, six tablespoonfuls a day, can be given quite safely to a calf a month or 6 weeks old, though more than this is apt to cause scouring.

Stewart, in experiments at Garforth, used a low-grade form of dripping, of which he found it practicable to give to each calf 6 oz. per day along with separated milk. The results were fully equal to those obtained previously with cod-liver oil.

Separated Milk and Meals.—A great variety of calf meals or cream substitutes has been successfully used, but most contain linseed as a prominent ingredient. Linseed alone may be used either as boiled whole linseed or in the ground form.*

Lawrence, at Newton Rigg, prepares boiled linseed as follows: Two pounds of linseed are put to soak over night in 3 gal. of water, boiled and stirred the next day for 20 minutes, and 5 minutes before the boiling is finished ½ lb. of flour† (previously mixed with enough water to prevent it being lumpy) is added to this gruel to counteract the laxative tendency of the linseed. This will keep sweet for several days, and may, therefore, be made in considerable quantity; 1 pt. of this gruel is added to 4 pt. of separated milk.

Where ground linseed is preferred, unground linseed is obtained to ensure having the whole of the oil, and is ground by ordinary farm mills. (The common types of steel grist mill will grind linseed alone without difficulty, but with stones it is advisable to add one part of Indian meal to seven of the linseed to prevent it clogging the mill.) This meal is scalded and stirred with boiling water at the rate of 1 qt. of the meal to 1 gal. of water. This makes a porridge of much nicer consistency than the boiled linseed, and is more quickly and easily prepared; 1 pt. of this porridge added to 4 pt. of separated milk will be sufficient for a calf 4 to 5 weeks old. Linseed cake meal is frequently employed for making a calf porridge to add to skimmed or separated milk, but, although a wholesome food, it does not enrich the milk with fat as linseed itself does, for linseed cake does not contain more than 12 per cent. of oil, whereas linseed contains up to 36 per cent.

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* Linseed porridge should not be kept for long periods, since some samples of linseed slowly develop poisonous properties (due to prussic acid) on keeping in a moist state. The risk is avoided if the porridge be well boiled.

† At the present time, since it is not permissible to use flour, the finest grade of milling offal (fine middlings or fine thirds) or finely-ground maize meal should be substituted.

Campbell, at Garforth, obtained satisfactory results with a mixture of linseed meal (2 parts), oatmeal (1 part), rice meal (1 part), and locust bean meal (1 part), all ground as finely as possible and passed through a sieve.

Voelcker, at Woburn, has successfully used crushed oats along with separated milk. The calves were kept on whole milk until 3 or 4 weeks old, and towards the end of this period a handful of the crushed oats was mixed with the milk, and by the sixth week, when they were put entirely on to the separated milk, each calf was eating about 1 lb. per day along with 1½ gal. of separated milk. After the calves were 12 weeks old the oats were given dry. Calves will soon take to oats in this form if they are put into the pail just before the milk is finished.

Many of the proprietary "cream equivalent" meals on the market are also said to have given satisfactory results.

The procedure in rearing is much the same whether oil or meals be used as cream substitute. Where the utmost economy of whole milk is desired it is usual to allow the calf for the first two weeks of its life about a gallon per day of whole milk in three meals. Separated milk is them gradually substituted for the whole milk, and at the end of the fourth week the calf will be getting 1½ to 2 gal of separated milk daily, with the addition of some meal. As an example of subsequent practice the method followed by Lawrence may be quoted :—

New milk is discontinued at the end of the first month, and for the next month the allowance of separated milk for each of three meals is 3 qt. with cream substitute. If the calf is intended for veal an extra pint of milk is given, and the fattening is hastened by a further addition of boiled oatmeal to the milk. Calves not intended for veal are given sweet meadow hay in the fifth week, at which age they begin to chew the cud. At the ninth week the mid-day milk is replaced by a handful of linseed cake (6 oz.), and the calves get a good drink (5 qt.) of separated milk morning and evening without cream substitute. As they get older the hay and linseed cake are gradually increased until in the fifth month the calves receive ½ lb. of linseed cake a day and eat about 5 lb. of hay. A little crushed oats (½ lb.) is now added to the cake, and sliced swedes are given. At six months milk may be discontinued altogether, but this comes about gradually, the evening's milk being first stopped; in fact, all food-changes with calves should be gradual.

Calves born before March are turned out to grass as soon as the weather is mild (June probably), but do not lie out at night until hoar frosts are well at an end, and they continue to receive their daily allowance of linseed cake and meal. Calves born in the spring and summer months are not turned out that year, experience having shown that these calves thrive much better off the grass, escape that very troublesome calf disease—hoose, and turn out better stores the following spring. Indoor calves begin to receive green-meat, such as cut grass or vetches in the summer, and sliced swedes in the winter, when 5 months old. Their feeding during the second half of the first year simply consists in foddering with hay and serving with cut swedes morning and evening in steadily-increasing quantities, giving cake and meal at midday up to 1 lb. of cake and ½ lb. of meal per head at the age of from nine to twelve months, and letting out to water and exercise at 10 a m. A lump of rock-salt lies at each end of their trough for them to lick. Regularity of feeding is a matter of prime importance in the management of all kinds of cattle.

The calf dietary for the first six months as above described may be shortly tabulated as follows :—

First Week —Its own mother's milk warm three times a day, commencing with about a quart and increasing to two quarts at each meal by the third day

Second Week —Two quarts of warm new milk (not necessarily its own mother's) three times a day.

Third Week —Two pints of new and three pints of skim (or separated) milk, with half a pint of linseed porridge or half a tablespoonful of cod-liver oil, three times a day

Fifth Week —Three quarts of warm skim milk, with one pint of linseed porridge or one tablespoonsful of cod-liver oil three times a day, and a little sweet meadow hay, increased week by week

Ninth Week —Mid-day milk and cream substitute omitted. Five quarts of separated milk are given morning and evening, a handful of broken linseed cake (6 oz) at mid-day, and hay, increasing week by week

Thirteenth Week —Milk as before, ¾ lb. mixed linseed cake and crushed oats, ½ gal. pulped swedes (green-meat in summer), gradually increasing, hay *ad lib.*

Twenty-first Week.—Milk as before, 1 lb of mixed linseed cake and meal, increasing quantities of roots, hay *ad lib.*

Twenty-fourth Week.—Evening milk discontinued.

Twenty-seventh Week.—Milk altogether discontinued.

Although skim-milk is somewhat richer in fat than separated milk, the latter has an advantage over the former in being.

perfectly fresh and sweet when given to the calves, and if served to them morning and evening shortly after being separated, needs no warming. It will pour into the calf pail clear of the froth if allowed to stand for a short time, or the froth may be held back with the hand.

2. *Milk-selling and Cheese-making Farms.*

On dairy farms where the milk is sold or made into cheese, separated milk is only available, if at all, in very limited quantities, and the problem of calf-rearing becomes more difficult.

In view of the price obtainable for both milk and cheese, the ideal in these cases would be to rear on a milk substitute. Unfortunately, both experience and experiments show that to eliminate milk altogether in rearing is extremely undesirable, if not practically impossible. Much, however, may be done with a little milk judiciously supplemented with other foods. These foods should be selected to furnish as nearly as possible an equivalent for the milk when the use of the latter is entirely suspended. It is not difficult to devise from a table of foodstuffs a calf meal that shall closely resemble milk in its digestible constituents, but this cannot be done without at the same time introducing indigestible matter which is absent from milk. The consequence is that, unless the greatest care is taken, calves reared on calf meals alone are "pot-bellied," badly-grown animals, instead of having the well-grown, level-fleshed, and alert appearance of milk-fed calves.

This question of indigestible matter, and that of choosing meals that will agree with the calf, constitute the practical difficulties; and yet probably most milk-sellers and cheesemakers would be glad to rear the heifer calves from their best milking cows if there were a fair prospect of doing so successfully with very little milk. The following meals have been found by Lawrence to be good milk substitutes, and, used as directed, provide an albuminoid ratio about the same as that in new milk—

CALF MEAL No. 1.—Used when a small quantity of separated milk is available :—

8 parts of oatmeal (by weight).
1 part of ground linseed.

Scald 2½ lb. over night with 5 pt. of boiling water, boil for ten minutes next morning, and add 5 pt. of separated milk with about ¼ oz. of salt and 2 oz. of sugar.*

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* The use of sugar must be omitted under present conditions.

No 2.—**When no separated milk is available** :—
2 parts linseed cake meal.
2 „ oatmeal.
1 part ground linseed.

Mix 2½ lb. with 5 qt, of boiling water over night, and boil for ten minutes next morning; serve with salt and sugar as with No. 1.

No. 3.—Requiring no boiling :—
14 parts linseed cake meal.
5 „ ground linseed.
2 „ wheat flour.*
2 „ locust bean meal.

Mix 2½ lb. with 5 qt. of boiling water and a sprinkle of salt

In each case the gruel should be thinned down with water to the required consistency.

Where No. 2 or No. 3 is used it is introduced and the new milk reduced very gradually.

The following mixture also gave satisfactory results in trials at Garforth :—

1 part ground linseed.
3 parts malt, ground and sifted.
6 „ pea meal, ground and sifted.

The mixture was scalded and then reduced to the proper temperature (about 100° F.) with cold water, and fed as a gruel.

In preparing gruels of this meal mixture the most suitable proportions at the beginning are ¼ lb. meal to 1 qt. of water (or 1 lb. meal to 1 gal. of water), and 1 pt. of the gruel can be substituted for 1 pt. of new milk every three to four days, until gruel only is given at the age of seven to eight weeks. The amount of gruel may be gradually increased to 1½ gal. per day, and the proportion of meal also increased until each calf is getting 1½ to 2 lb. of meal (as gruel) per day. The total quantity of new milk required for each calf in this system of feeding is approximately 50 gal.; some strong, thriving calves may do with less, but others with more delicate digestions may require more.

When the calves are about six weeks old a little good meadow hay should be given, and from eight weeks onwards some dry trough food, such as crushed oats, finely-broken linseed cake, or bran. The allowance of gruel should be gradually reduced during the sixth month. By this time the calves should be well accustomed to dry foods, and should receive 1½ to 2 lb. per day, and grass, green forage or "fingered" roots, according to season.

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* See footnote † on p. 971.

Dry Meals as Milk Substitutes.—Owing to the time and care required in the preparation and feeding of gruels, and the difficulty of finding reliable labour for this work at the present time, trials in which the milk substitute was given in the form of a dry meal have recently been carried out. New milk was given for the first four weeks, and during the next three to four weeks the new milk was gradually reduced and dry meals and water (in separate receptacles) given instead.

The following meal mixtures have been used with success at the Midland Agricultural and Dairy College :—

Linseed cake (finely nutted)	4 parts.
Wheat germ meal	5 ,,
Dried yeast	1 part.

The mixture, with a little salt added, was given at the rate of ¼ lb. per calf daily at the beginning, and it was increased gradually as there was no difficulty in getting the calves to take it. During the transition period a little was given as a gruel in the milk—an excellent gruel being obtained simply by soaking in water 12 hours before feeding.

Linseed cake (finely nutted)	4 parts.
Bean meal	5 ,,

This mixture, also with a little salt, was fed in the same quantity as the previous mixture and with equally satisfactory results.

The total quantity of new milk consumed by each calf was from 35 to 40 gal. ; the allowance of dry meal was gradually increased from ¼ lb. per calf per day when 4 weeks old, to 2¼ lb. per day when 14 weeks old. Hay was given from the sixth week onwards. During the period of experimental feeding (11 weeks) the calves in both lots increased in live weight at the rate of fully 1 lb. per head per day and were equal to another lot reared on separated milk and crushed oats.

Other foods, *e.g.*, crushed oats, palm nut meal, beans and maize have been used by themselves with water, but the results up to the present have not been so satisfactory as those from the use of a mixture of meals.

Use of Whey in Calf Rearing.—Whey is not well adapted for calf-rearing, for the casein as well as the fat of the milk has been removed in the making of the cheese. Calves fed on whole milk for the first month, however, have been known to thrive well subsequently on about 1½ gal. daily of warmed whey, together with crushed oats or maize given dry.

On cheese-making farms in Cheshire the following method of using whey for rearing calves is successfully practised:—

"Directly the whey is run from the curd, it is put into a large copper, and then heated over a quick fire. The albumen coagulates, and, just before boiling point, rises to the top in flakes, known as 'fleetings.' These are skimmed off as they rise. The whey must on no account be allowed to boil, or the 'fleetings' will sink to the bottom. To assist them to form it is often helpful to add 2 or 3 qt. of cold whey. This also checks the bulk from boiling.

"The boiler must be thoroughly cleaned out each day after use, and for this purpose a soft brick or rubbing stone is best.

"The calves are fed twice a day as follows:—

First Week.—4 qt. milk per day.
Second Week.—6 qt. milk per day.
Third Week.—6 qt.—half milk and half 'fleetings' per day.
Fourth Week—8 qt.—2 qt. milk and 6 qt. 'fleetings' per day.
Fifth Week.—8 qt.—1 qt. milk and 7 qt. 'fleetings' per day.
Sixth Week.—8 qt. 'fleetings' per day.

"Milk is rarely given after the calves are 6 weeks old. As soon as possible a little soft or meadow hay is given to the calves, and after about a week's time a little bran as trough food. When the calves are 6 weeks old, and are getting no new milk, a little linseed-cake and kibbled oats in equal proportions are added to the bran. Each calf is allowed about ½ lb. of the mixture. This is gradually increased to about 1 lb. per calf per day. The calves are put out to pasture when they are finally weaned (about 5 months old), generally about the second week in June. The quantity of 'fleetings' is gradually reduced, and in the last week only one feed per day is given. The weaning process extends over 2 weeks. If the weather is very wet or cold, the calves are brought in for a few nights, and get a little corn and cake, otherwise they are left out at pasture for about 3 months, and are entirely dependent upon the grass."

*Loss of Calves.**

One of the first signs that a calf is out of health is loss of appetite; it is advisable, therefore, whenever a calf hesitates to take its milk, to remove the milk at once and administer a tablespoonful of castor oil shaken up with twice this quantity of hot water. This usually puts matters right, even when "white scour" is commencing.

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* For information as to White Scour in calves, see Leaflet No. 101 (*Prevention of White Scour in Calves.*)

Loss among calves is often attributed to the feeding of cotton cake to the cows, but there seems to be no reliable evidence in support of this opinion. On Mr. Lawrence's farm, where the cows regularly receive cotton cake, there have been only five calves lost in nine years out of a total of 180 calves born.

PIG FEEDING.*

THE present scarcity and high cost of feeding stuffs render inevitable a revision of past methods of pig-feeding. In the past the pig has received large quantities of food substances, such as potatoes, barley, maize and peas, which might have been used directly or in the form of flour or meals for human consumption. So long as the supplies of these foods left a surplus above the requirements for direct human consumption no objection could be taken to this course, but now that such a surplus no longer exists the use of such materials for pig-feeding must be regarded as wasteful and contrary to the national interest. It could at least only be justified if it could be shown that an actual increase of food supplies could be obtained by feeding these materials to the pig. Experience shows, however, that it takes about 7 lb. of concentrated food to produce 1 lb. of pork or bacon. Yet 7 lb. of cereals would yield about 5 lb. of flour or 7½ lb. of bread, and this is sacrificed to produce 1 lb. of pork which, despite its special appeal to the palate, has actually less nutritive power than 1 lb. of grain.

Obviously, then, the feeding of sound bread-corn to pigs cannot be countenanced so long as the people's bread-supply is in danger of curtailment. To-day the pig must be restricted as far as possible to materials which cannot be used for human beings, such as grass, roots, acorns, silage, bran, pollards, sharps, damaged grain, fish meal, dried yeast, dried grains, malt culms, oil cakes and meals, together with waste products such as whey, food refuse of all kinds, and surplus vegetable matters from the garden or allotment. Further, for many of these materials he must compete with the cow, the bullock, and the sheep, all of which can establish a claim to priority over the pig in so far as they are able, with the aid of relatively small quantities of concentrated foods, to convert large quantities of course materials, such as hay and straw, into meat or milk.

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* This article was issued in November as Food Production Leaflet No. 19 to replace Special Leaflets Nos. 16 and 71, and Bulletin No. C 9 of the Food Production Department.

The present article is intended to furnish guidance on pig-feeding under present conditions, and for the guidance primarily of the allotment holder or owner of a fair-sized garden who desires to keep a pig for the economical utilisation of surplus produce and garden waste, a few introductory paragraphs on selection of the pig, housing, etc., have been included. Further, in addition to dealing with the indoor feeding of the pig, which represents the common practice of the past, an outline is given of successful outdoor feeding methods which have attracted much attention of late years.

The small pig-keeper will do well to pay special attention to the following conditions, which will largely affect the success of his operations :—

The essential conditions are :—

1. Selection of suitable type of pig.
2. Cheap but weather-proof sty with adequate ventilation.
3. Regular and sufficient feeding.
4. Systematic collection of house refuse to cheapen cost of upkeep.
5. Plentiful supply of vegetable matter.

Type of Pig.—The small pig-keeper should select the type of pig that is the most popular in his district, the reason being that should he wish to sell he will probably have to rely on a local buyer. *This is important.* Pork, rather than bacon, should be the aim.

For making into pork, Berkshires, Middle Whites, Lincolnshire Curly Coated and Gloucestershire Old Spots are preferred by many pig-keepers, but any good quality sow of local breed crossed with one or other of the breeds referred to will generally answer the purpose.

A start should be made with a newly-weaned pig, about eight weeks old. An extra shilling or two spent in a good pig will be amply repaid. It must be an animal with a vigorous constitution—a greedy, lusty fellow, active on his legs, lengthy and round in shape.

Housing.—No elaborate structure is necessary. The main essentials are comfortable and clean conditions, with a dry bed, suitable ventilation, and the absence of draughts. The foundation must be dry, and the sty should, if possible, face the south. In the higher parts of the walls openings should be provided through which the passage of air may be easily regulated, in order that the temperature may be kept as even as possible throughout the year. A cheap, wooden erection would serve, or the walls may be built of brick or concrete, or wood on a brick foundation, and the building may often take the form of a lean-to. It should be high enough to obviate all difficulty in cleaning out. A roof of wood covered with thick tarred felt will suffice to keep out cold and wet. The floor is the most important part of the sty. Concrete is the most suitable material. This should be left rough, to afford a foothold. Part of the floor, sufficient to provide bed accommodation for the pig, should be covered with a movable wooden platform. Hard bricks also make a good floor. To ensure drainage the floor should slope gently to the front of the sty. The drainage should not be wasted, but should pass into some convenient receptacle, or into a sunk dung-pit for use in the garden with the pig's manure.

Bedding.—Where straw is not available, dried bracken, grass and leaves make thoroughly efficient bedding. Every effort should be made to provide an abundant supply, especially in cold weather.

Collection of House Refuse.—Householders unable to keep pigs themselves may assist by setting aside edible waste material for the feeding of pigs belonging to other people. Where a number of people, either individually or in combination, *e.g.*, a group of allotment holders, erect a piggery, a trolley would be the best means for collection. The garden and kitchen will supply a considerable porportion of the animal's food. Refuse from butchers, poulterers, fishmongers, fruiterers, greengrocers, dairies, hotels, boarding-houses and other dwelling-houses, can similarly be turned into valuable meat. The necessary organisation and collection of waste material might well be undertaken by local corps of women as voluntary war work.

The refuse should be collected and used while fresh and sweet, and if it can be boiled or steamed first, all the better.

Swill or dish-water should not be used as it contains washing soda or salt, both of which, if given in excess, are injurious to the animal's health.

Feeding.—For several weeks after weaning the pig should receive its foods in a moderately sloppy condition, slightly warm if the weather is cold. The food may consist of kitchen waste (a very small quantity until the pigs are about 12 weeks old), and a little coconut cake (soaked overnight), or sharps, and sufficient water should be added to give the whole the consistency of gruel. A newly-weaned pig will usually require about 2 lb. of food per day, 1 lb. of which should consist of coconut cake or similar material.

The young pig should be fed regularly three times a day, the food being gradually increased, as much being given at each meal as the pig will readily clear up. Dried blood, meat, and fish scraps, a little at a time, are desirable.

It is important that vegetable food should form part of the diet at all seasons. Young grass from the wayside, weeds from the garden, and similar material will all be picked over by a young growing pig. In the dead of winter reliance must be placed chiefly on small potatoes, and on parnips, turnips, artichokes, etc.

When the pig is about 100 lb. in weight feeding should be rather more forced. Meal may be given more freely, and vegetable foods reduced. Acorns or beech mast may be introduced into the feeding at this stage. (See the Board's Leaflet No. 291, *The Food Value of Acorns and Beech Mast.*)

Another important point to remember is the necessity of supplying a regular allowance of gritty material, preferably small coal or wood ashes, or, failing these, earthy turf.

A pig should weigh from 170 lb. to 180 lb. from 5 to 6 months old, when it should be ready for killing. The amount of food required at this stage will be from 5 to 6 lb. of meals or their equivalent daily, and the dressed carcass should weigh from 130 lb. to 140 lb.

Rations.—A few examples of rations are appended. *In each case Ration 1 represents a mixture of feeding stuffs in common use in the past, while the alternative (Ration 2) shows how by using other feeding stuffs the diet may be cheapened, and restricted mainly to materials not required for human food. At the present time it is highly important that materials which can be used for human food should not be fed to animals.*

Along with the foods specified it is intended that the pigs should receive a moderate allowance of house refuse, or such roots and green forage as may be available. The precise amounts will depend on the kind and quantity of the other food material available. If the feeding be entirely restricted to meals the total allowance of meal in the rations given below will need to be raised by ½ lb. to 2 lb., according to the size of the pig. In the winter months roots should be boiled and mashed and the meals incorporated immediately before feeding. About 4 lb. of waste potatoes or sugar beet, or 5 to 6 lb. of parsnips, or 8 to 10 lb. of carrots, turnips, cabbages, etc., are equivalent to 1 lb. of mixed cereal meals for pig-feeding. (See Table, p. 985.) Such vegetable material should be used in the proportion of 4 or 6 lb. to 1 lb. of meal. For pigs up to 3 months old, at least a little skim or separated milk is most beneficial, and when procurable at about one-sixth of the cost per lb. of mixed meals it will invariably prove economical (1 gal. of milk weighs approximately 10 lb.). Whey is also useful but is worth appreciably less than skim milk.

Rations for Pigs of 25–60 *lb. Live Weight.*

(1) ¾ lb. Middlings.
¼ ,, Barley meal.

(2) ¼ lb. Bran .. .. .. ¼ ,, Coconut cake or linseed cake meal. ½ ,, Sharps	*or*	¼ lb Fish Meal. ¼ ,, Maize gluten feed. ½ ,, Sharps or bran.

Rations for Pigs of 60–100 *Live Weight.*

(1) 1 lb. Sharps.
1 ,, Barley meal.

(2) ¼ lb Middlings .. .. .. ¾ ,, Dried grains .. .. ½ ,, Palm-nut cake, coconut cake or bean meal. ¼ ,, Fish meal	*or*	2 lb Maize gluten feed.

Rations for Pigs of 100 -180 *lb. Live Weight.*

(1) 1 lb. Sharps
1 ,, Barley meal.
1 ,, Maize meal

(2) 1 lb Fine sharps or Middlings 1 ,, Dried grains .. .. 1 ,, Palm-nut cake, coconut cake or bean meal ..	*or*	3 lb Maize gluten feed.

Daily Rations for Sows.—1. Pregnant sows up to within 3 or 4 weeks of farrowing will find most of their food out of doors, preferably in a well-fenced grass or lucerne enclosure provided with shade and shelter. When vegetation is scarce, potatoes, mangolds and other roots may be scattered on the ground. About 3 lb. of sharps or 2 lb. sharps and ¾ lb. palm kernel meal per head, per day, in addition to vegetable food, will suffice during this period. In the last month of pregnancy a more nourishing but still laxative diet is required, on the lines of those suggested for suckling sows.

2. For sows suckling their young the following rations are recommended :—

Ration 1.	*Ration* 2.	*Ration* 3.
4 lb. Sharps	4 lb. Sharps or middlings.	3 lb. Sharps
4 ,, Middlings.	3 ,, Bran.	3 ,, Bran.
2 ,, Bran	2 ,, Palm kernel meal.	2 ,, Maize gluten feed.
	½ ,, Fish meal.	2 ,, Palm kernel meal.

The total quantities shown in the foregoing rations assume that only such foods are fed, with water ; they should be varied somewhat according to the appetite of the animal and the amount of vegetable food and dairy by-products available. A supply of vegetable food is very advantageous.

Outdoor Pig Keeping.—In view of the scarcity and costliness of feeding stuffs it is highly desirable that pig-keepers who have access to grazing or woodlands should give the fullest trial to outdoor feeding methods. The following advantages are claimed for the outdoor system:—

(1) A great saving of meal is effected.
(2) Breeding sows are more prolific and much hardier than those kept in sties.
(3) The young are bigger and hardier than sty-bred pigs
(4) Pasture is improved by pig-grazing.
(5) Valuable food material such as acorns, often wasted, is turned to useful account.

Green food alone will not as a rule fatten pigs, but it will keep them in healthy condition and save a great deal of meal. With a few weeks of sty-feeding on concentrated food at the end of the grazing period, prime bacon can be produced. Barren sows have actually been fattened on good pasture without any supplementary foods, and palatable pork can also be produced under the same conditions. It is necessary that pigs should be accustomed gradually to the outdoor life.

The growing of special forage crops for folding with pigs or for "soiling" is not to be recommended at present, in view of the necessity of using arable land for the cultivation of cereals. Clover, lucerne or ordinary pasture will provide the best grazing crops for pigs under present circumstances. In grazing lucerne care must be taken not to overstock it. The number of animals should be regulated to allow two or three cuttings yearly. Over-pasturing without mowing injures the crowns of the lucerne plants. The cut lucerne may be made into hay and fed to pigs during the winter along with other foods. Pig-grazing might be more generally practised in standard orchards.

Before turning pigs on to pasture they should be ringed. They may be folded or allowed to run at large. Folds should not be too small, or the pigs tend to deposit their manure mainly on the boundaries.

Fencing is of course a difficulty at the present time: it may, however, be worth mentioning that, in the event of pigs "nosing" under a fence, a barbed wire fixed close to the ground will prove a sure deterrent. Two strands of barbed wire fixed 6 in. and 15 in. respectively from the ground will effectually confine all pigs. Hurdles are suitable for folding.

Breeding Stock.—The reduction in the number of pigs which is necessary to meet the present abnormal conditions must not be allowed to endanger the future of the breeds, and an adequate nucleus should be retained to insure the re-establishment of the pig industry after the War. No hard and fast rules can be laid down for the guidance of pig-keepers in selecting a suitable type for grazing. Pedigree stock of probably all the breeds will soon adapt themselves to an out-door life, but for general purposes a good quality sow of the local breed, crossed with a boar of an early-maturing breed, such as the Middle White, will usually prove satisfactory.

As a general rule, in-pig sows and gilts may be turned out to pasture from April to October and given only a minimum of concentrated food. If the pasture is a good one no supplementary food may be required. In the winter months they may be allowed to run out in paddocks with access to shelter up to within a few weeks of farrowing Shelter may consist of cheap erections made of wood faggots and hurdles stuffed with straw If possible, access should be given to mature woods. The animals will continue to find a considerable proportion of their food on the pasture and in the woods, especially if the latter contain an appreciable number of nut-bearing trees and edible plants. In addition, mangolds or other roots should be supplied, and a pound or two per head per day of beans or their equivalent

Farrowing should be regulated so as to occur not later than July, with the second litter coming about January. The first litter could then be disposed of for slaughter in the autumn without necessitating the use of any appreciable quantity of concentrated food. As a rule, sows should be brought home to farrow During the suckling period the food may consist largely of succulent herbage, roots, waste potatoes, silage and chaffed clover or lucerne, with the addition of about 3 lb. of concentrated food. The condition of the sow should determine whether more than this amount of concentrated food is given. Roots, potatoes and chaff should be boiled or steamed, and to this should be added some milling offals or finely-ground oil-cake at the rate of 1 lb. of the concentrated food to 10 lb. of roots or similar food.

Feeding of Store Pigs.—Young pigs should still receive a moderate allowance of meal during weaning. When they have reached the age of 10 weeks they should be encouraged to find most of their food out-of-doors It may be necessary that pig-feeders should cater chiefly for the pork market.

Cases are known where porkers sold off pasture have made good prices in the London market without the aid of any concentrated food; as a rule, however, an average of about 1 lb. per head per day should be allowed. For the production of bacon pigs should, during the last two or three weeks, be prepared for slaughter mainly on concentrated food.

In the case of sty-fed pigs, the aim should be to produce pork rather than bacon. In the winter months, if possible, pigs should be allowed to run in the yards with bullocks. In addition to "gleanings" found there, they should receive a mixture of boiled roots or waste potatoes with a very little of the coarser offals, say 1 lb. of offals to 10 lb. of roots or similar food.

Consumers generally must be content with a lower standard of "finish" than has been customary hitherto.

Relative Value of Feeding Stuffs.

As a guide in the selection of supplementary foods for pig-feeding, the following figures, mainly based on the practical feeding trials of Hansson, may prove useful. They are given for the general guidance of the pig-feeder in considering how foods previously used and now to be excluded can best be replaced. As already indicated, no food suitable for human beings should now be given to pigs. Most of the figures relate primarily to dairy cows, but, on the whole, they may be considered fairly reliable for other classes of stock:—

	Lb. of Food equal to 10 lb. of Barley.		*Lb. of Food equal to 10 lb. of Barley*
*Barley	10	*Separated milk	60
Wheat	10	Butter milk	60
Oats	12	Whey	120
*Maize	9½	Mangolds	90
Peas	10	Carrots	80
Beans	10	Swedes	100
Earthnut cake	8	Turnips	125
Linseed cake	9	*Potatoes	40
Coconut cake	9	Clover hay	22
Palmnut cake	10	Lucerne hay	25
Wheat bran	12	Green clover	70
Gluten feed	9½	Green lucerne	75
Dried yeast	8	Pasture grass	63
Dried grains	13		
Malt culms	13	Silage (oat and vetch)	100

* Confirmed in experiments with pigs conducted by the Department of Agriculture and Technical Instruction for Ireland

Use of Acorns for Stock Feeding.

THE shortage of all kinds of concentrated feeding stuffs has brought the humble acorn into greater prominence this season, and the following notes on the feeding of acorns to stock may be of interest to farmers.

Horses.—Information has been supplied by a well-known Norfolk landowner, who had been feeding acorns to 26 of his agricultural horses very successfully during the last six weeks. For the first two weeks the ration consisted of 3 stones of acorns, 1 stone of maize, and 2 stones of bran per horse per week. Then, owing to the shortage of maize, 2 stones of palm kernel cake were substituted for the maize ration. During the winter it is proposed to replace the palm kernel cake by 1 stone of ground nut cake and 1 stone of fish meal. The writer comments: "This may be considered by many to be an inadequate food, yet our horses are making full days and working hard, ploughing, and dragging timber, etc. In addition they have straw chaff and 1 stone of hay per horse per day. They look well and the acorns have not shown bad effect. Should signs of constipation appear each horse would be given 1 pt. of linseed each week, the linseed being previously soaked until it forms a jelly."

As regards the method of storing and grinding the acorns, the farmer gives the following particulars:—

"Acorns when stored in the granaries should be moved every two to four days, and perhaps oftener if the weather is damp and mild. There is some difficulty in getting this properly and conscientiously done. On their first arrival the acorns may be scattered, say, 1 in. thick on the floor, and afterwards shovelled, or moved with a large wooden hoe, into long lines across the building, the depth of them being in accordance with dryness and space; this ensures that the lines are turned quite over and the lower acorns brought to the top.

"It is desirable that these lines should always be moved in the same direction if possible, the wet ones coming in at one end of the building, and passing out to be ground up, from the other end; in this way the moving and turning of every acorn is more assured.

"It is most important that the acorns should be thoroughly dried before being ground; they should also be sifted so as to extract all dust and grit.

"They can be ground satisfactorily by the ordinary grist mill driven by a farm threshing engine, and no doubt also by an oil engine of similar power.

"When quite dry the acorns can be ground as fine as barley or maize meal, as by so doing the shell becomes slightly more digestible, but this cannot be done without admixture with some drier ingredient such as maize, palm kernel or ground nut cake. It might be possible to grind them alone if they have been kiln dried, but this is quite unnecessary. If the nuts are too large, or the cake requires it, they can, of course, be passed through the cake-breaker.

"The grinding is rather a slow process, and the cost works out about 2*s.* 9*d.* per coomb or sack. The cost of collection is 4*s.* per sack, and of carting and turning 1*s.* 3*d.*, so that the total cost is 8*s.* per sack.

"It is important that the food as soon as it comes from the mill should be mixed with the bran; this dries it, and prevents heating. It should immediately be spread over the granary floor, say 3 in. deep, and turned every day. The rations should be served to the horsemen from the granary every day, as otherwise it would probably be carelessly stored by them and then would certainly heat and spoil."

Cows.—Another farmer, from Hampshire, has supplied notes on his experience in feeding acorns to cows. He says: "I have been feeding acorns to cows during the last five years, and have had excellent results with both fattening and milking cows. My method is to start with a gallon a day, and gradually increase to about 4 gal. When my stock of acorns runs out the falling off in milk is most marked. The butter made at the time of feeding acorns is of good quality and rich colour. If there is any difficulty in getting any of the cows to start eating the acorns, I mix them with a little bran or cake. I have never had any ill effects from feeding acorns, but I always make a point of giving the cows some long stuff or hay.

"Until recently I have been accustomed to pay 1*s.* a bush. for acorns, and have secured 200 to 300 bush. in a season. This year, unfortunately, I have only been able to get 100 bush. and have paid 1*s.* 6*d.* per bush. for them. I put them in heaps, not too thick, and let them spear (? sprout) about ¼ in."

See also the Board's Leaflet No. 291 (*The Food Value of Acorns and Beech Mast*).

A note on two cases in which acorns were successfully fed to horses and sheep appeared in this *Journal* in October, 1915, pp. 686–7.

Notes on Feeding Stuffs in January:
From the Animal Nutrition Institute, Cambridge University.

Now that the Food Controller has fixed maximum prices for certain feeding stuffs, it is no longer necessary to record the monthly variations in price. Table I. has accordingly been modified, and now replaces the former Tables I. to IX. It does not at present include all feeding stuffs, as there are still some articles for which prices have not yet been fixed. These will be included as soon as prices have been announced. The fixed prices are an appreciable reduction on the prices recently obtaining, but supplies are short, and in some districts it is practically impossible to buy at the fixed prices as old stocks are not yet cleared. This will, no doubt, right itself very soon.

Supplies of all classes of feeding stuffs are small, and are likely to become smaller on account of the scarcity of shipping and the absolute necessity of using for human food every thing suitable for that purpose.

Horses.—The oat crop, despite the increased acreage, is not yielding well, and there is likely to be a scarcity of oats as time goes on. It is therefore most necessary that every possible economy should be exercised in the use of oats for horses.

Milking Cows.—Already there are signs of local milk shortages, and as milk is an absolute necessity for large classes of the community, cowkeepers should spare no effort to feed their cows in such manner as to maintain their milk yield. Fortunately the supplies of palm kernel and ground nut cakes are as good as is the case with any kind of feeding stuff, and both these cakes are suitable for milk production. Fortunately, too, they are cheaper per food unit than any other feeding stuffs on the market. The priority scheme for securing feeding stuffs for cows which is promised by the Food Controller has not yet been issued.

Cattle for Beef Production.—The following notes, published in the October *Journal*, are still applicable and may be repeated :—

" Winter feeding for beef under present conditions was fully discussed last month (*i.e.* September, 1917), when figures were given to show that 2-year-old stores would put on flesh at the rate of about 1 lb. per head per day on roots, hay, and straw, with from 1 to 2 lb. per head per day of cake, preferably either decorticated ground nut cake or decorticated cotton cake. More cake than this is not likely to be available. If anyone uses more, others must go entirely without.

Cattle on such a ration will make as much, or nearly as much, manure as cattle on a full cake ration. The manure will contain the same bulk of organic matter which is the constituent required for maintaining the permanent fertility of the soil. It will, however, be deficient in soluble nitrogen as compared with good 'cake fed' manure, but this deficiency

TABLE I.

Name of Feeding Stuff.	Fixed Price per ton.			Number of Food Units per ton.	Price per Food Unit.	
	£	s.	d.		s.	d.
Cakes, British made—						
Linseed cake	19	0	0	120	3	2
Cotton seed cake	14	10	0	72	4	0
Ground nut, undecorticated	17	5	0	104	3	4
,, decorticated	19	0	0	145	2	7½
Palm kernel cake	13	15	0	96	2	10
Rape cake	14	0	0	106	2	9
Copra or coconut cake	15	5	0	103	2	11½
Sesame cake	18	10	0	100	3	8½
Meals, British made—						
Palm kernel meal	13	10	0	92	2	11
Rape meal	14	0	0	103	2	8½
Soya bean meal	18	15	0	124	3	0
Cakes and meals, imported—						
American linseed cake	19	5	0	119	3	3
Argentine ,, ,, ...	19	15	0	115?	3	5
Canadian ,, ,, ...	19	10	0			
Australian ,, ,, ...	19	10	0			
Spanish and Portuguese linseed cake ..	19	10	0			
Egyptian cotton cake	15	0	0	72	4	2
Decorticated cotton seed meal ..	19	15	0	126	3	2
,, ,, ,, cake	19	15	0	126	3	2
Repressed cotton cake	20	15	0	?		
Rangoon rice meal	16	10	0	79	4	2½
Italian ,, ...	14	10	0	?		
Canadian ,, ...	17	0	0			
Egyptian ,, ...	17	0	0			
Hominy chop	17	15	0	?		
Gluten feed	17	5	0	122	2	10
Maize cake meal	17	5	0	?		
Compound cakes—						
Containing not less than 7 per cent. oil and 20 per cent. protein	17	15	0	100	3	6
Containing not less than 6 per cent. oil and 20 per cent. protein	17	10	0	95	3	8
Containing not less than 6 per cent. oil and 17 per cent. protein	17	7	6	90	3	10
Millers' offals—						
Fine grade—sharps	14	0	0	92	3	0
Medium grade—pollards	13	10	0	87	3	1
Bran	13	0	0	77	3	4½
Broad bran	14	0	0	80	3	6

can be remedied by the use of a top dressing of sulphate of ammonia, which is home-made and requires no shipping.

Farmers who have damaged corn which they can spare for their bullocks can economise even on the above cake ration."

Sheep.—The notes given in the *Journal* for October last are here repeated:—

"It was shown last month (*i.e.* September, 1917), that sheep over a year old will put on flesh in the winter at the rate of about 1¼ lb. per week on roots and hay, with a minimum of cake—not more than ½ lb. per head per day.

TABLE II.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Name of Feeding Stuff.	Nutritive Ratio.	Per cent. digestible.			Starch equiv. per 100 lb.	Linseed Cake equiv per 100 lb.
		Protein.	Fat.	Carbo-hydrates and Fibre.		
Foods Rich in both Protein and Oil or Fat.						
Ground nut cake	1 : 0·8	45·2	6·3	21·1	77·5	102
Soya bean cake	1 : 1·1	34·0	6·5	21·0	66·7	88
Decort. cotton cake ..	1 : 1·2	34·0	8·5	20·0	71·0	93
Linseed cake, Indian ..	1 : 1·9	27·8	9·3	30·1	77·1	101
Linseed cake, English ..	1 : 2·0	26·7	9·3	30·1	76·0	100
Cotton cake, Egyptian ..	1 : 2·1	15·5	5·3	20·0	40·0	53
Cotton cake, Bombay ..	1 : 2·5	13·1	4·4	21·5	37·6	49
Distillers' grains (English)	1 : 2·9	18·7	10·2	29·0	57·3	75
Distillers' grains, (French)						
Maize gluten feed	1 : 3·0	20·4	8·8	48·4	87·4	115
Brewers' grains, dried ..	1 : 3·5	14·1	6·6	32·7	50·3	66
Coconut cake	1 : 3·8	16·3	8·2	41·4	76·5	101
Palm kernel cake	1 : 4·5	14·1	6·1	48·9	76·7	101
Linseed	1 : 5·9	18·1	34·7	20·1	119·2	157
Bombay cotton seed ..	1 : 6·0	11·0	16·8	30·1	77·5	102
Fairly Rich in Protein, Rich in Oil.						
Maize germ meal	1 : 8·5	9·0	6·2	61·2	81·0	107
Rice meal	1 : 9·4	6·8	10·2	38·2	68·4	90
Rich in Protein, Poor in Oil.						
Fish meal	1 : 0·1	54·0	4·0	—	60·0	78
Peas, Calcutta white ..	1 : 2·1	23·3	1·1	45·9	66·9	88
Beans, English	1 : 2·6	19·3	1·2	48·2	67·0	88
Beans, Chinese	1 : 2·6	19·6	1·7	47·9	67·0	88
Peas, English maple ..	1 : 3·1	17·0	1·0	50·0	70·0	92
Palm-nut meal (extracted)	1 : 3·4	15·6	1·9	48·7	66·1	87
Brewers' grains, wet ..	1 : 3·5	3·5	1·5	8·6	12·7	17
Malt culms	1 : 3·6	11·4	1·1	38·6	38·7	51
Cereals, Rich in Starch, not Rich in Protein or Oil.						
Barley, feeding	1 : 8·0	8·0	2·1	57·8	67·9	89
Oats, English	1 : 8·0	7·2	4·0	47·4	59·7	79
Oats, Argentine	1 : 8·0	7·2	4·0	47·4	59·7	79
Maize, American	1 : 11·5	6·7	4·5	65·8	81·0	107
Maize, Argentine	1 : 11·3	6·8	4·5	65·8	83·5	110
Maize meal	1 : 13·0	5·5	3·5	63·9	77·8	102
Wheat middlings, fine ..	1 : 4·8	13·2	3·0	53·8	72·0	95
Wheat middlings, coarse or sharps	1 : 5·1	13·8	4·3	50·5	64·0	84
Wheat pollards	1 : 4·5	11·6	4·0	51·6	60·0	79
Wheat bran	1 : 4·7	11·3	3·0	45·0	49·7	65
Wheat bran, broad ..	1 : 4·7	11·3	3·0	45·4	48·1	63
Locust bean meal	1 : 22·1	4·0	0·7	69·2	71·4	94

Younger sheep require more cake, and more cake is not likely to be available. It should, however, be possible to spare some oats or damaged barley to supplement the small cake ration for sheep under 1 year old."

Pigs.—The scarcity of meals suitable for pig food is so acute that pig feeding on normal lines is practically impossible. Unless other methods are generally adopted the supplies of pork and bacon must almost disappear. Two other methods, however, are possible. Wherever roots are available it is possible to feed pigs with a minimum of meal. The rations and methods of feeding and the results obtained are fully described in the *Journal* for October, p. 721,* and November, p. 826.*

The other method depends on the collection of household refuse in towns, and requires organisation by the municipal authorities.

Notes on Manures in January:

From the Rothamsted Experimental Station, Harpenden, Herts.

FARMERS in the Midland and Southern counties who are extending their area of arable land will do well to realise how much the working of the farm is facilitated by drawing out the dung now that the ground is hard, and having it ploughed under in readiness for the spring. In the spring there will inevitably be a great rush of work as a result of the extra ploughing, and anything that can be done now to forward matters should be done. This is especially the case where an additional area of potatoes is contemplated, and where for this reason extra time will be needed for planting and work incidental thereto.

It is not enough to cart the dung out and leave it in scattered heaps. Widespread experience, confirmed by careful analysis, has shown that serious losses arise from little exposed heaps, besides great inequalities of crop. The dung must be spread as soon as convenient and ploughed under.

The advantage of being well forward with the work is so great that this would be worth doing simply for the sake of the saving of time in spring, but there is also an actual gain in crop, especially in the Midland and Southern counties. Some of the best Hertfordshire farmers regularly plough in the dung for their potato crops in autumn or winter, and thus allow time for rotting to take place, this resulting in the production of a series of highly valuable fertilising and soil-ameliorating compounds. The advantage of this practice has been tested by direct experiment in several places. At the Harper Adams Agricultural College, Shropshire, gains in the potato crop varying from 10 cwt. to 1 ton per acre were obtained as a result of winter application rather than spring application of the dung. In present circumstances such a gain in food production would be a great satisfaction to every patriotic farmer, even if it were done without any financial gain, but, as a matter of fact, the extra crop is very profitable. At present prices it would be worth from £3 to £6 per acre, besides the enormous advantage of saving time at a busy period.

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* Pig Feeding in War-time, by K. J. J. Mackenzie, M.A., and J. Fleming.

The crops grown were considerable: 12 tons 3½ cwt. per acre of "Great Scot" were obtained when the dung was applied in spring, but this was raised to 13 tons 4½ cwt. per acre when the dung was applied in winter. With the other varieties tested the crops were a little less, though still large: 10 tons 3 cwt. per acre of "Crofter" were obtained when the dung was applied in spring, but 10 tons 13¾ cwt. per acre when the application was made in winter. For "Culdees Castle" the figures were 10 tons 12½ cwt. and 11 tons 3 cwt. per acre respectively, a gain of 10½ cwt. for winter application.

A similar experiment was made with potatoes at the Holmes Chapel College, Cheshire, but in this case there was no gain in crop, although, of course, there was always the advantage of time gained in spring. For mangolds, however, and to a less extent swedes, there was a distinct crop increase: the spring application of dung gave 17 tons 14 cwt. of mangolds per acre, while the winter application gave 22 tons 2 cwt. per acre, a gain of 4 tons 8 cwt. per acre, worth probably £6 10s. per acre at present prices, in addition to the advantage of the saving of time. An increased crop from winter dressings was also obtained by Professor Gilchrist at Reading

In the North and in Scotland these results are not obtained. Spring dressings gave larger crops than winter dressings both in South-West Scotland and in Northumberland. Swedes in Northumberland gave 17 tons 13½ cwt. per acre when the dung was applied in winter, but 20 tons 17 cwt. when it was put on in spring—a falling off of 3 tons 3½ cwt. as a result of winter application. The loss was nearly as great in Berry's experiment in the South-West of Scotland, the winter application giving a crop of 2 tons 8 cwt. less than the spring application. In these cases it becomes more difficult to decide whether the saving of time is worth the loss of crop, and no general rule can be given; each case must be decided on its merits.

Flue Dust on Grass Land.—Several correspondents have asked whether flue dust can safely be applied to grass land on which stock is being grazed. The answer is that *flue dust ought not to be applied to any land unless potash is known to be needed.* The supplies of dust suitable for agricultural purposes are not unlimited, and those crops and soils which specially require potash ought to have the first consideration. It is again necessary to emphasise the fact that flue dust is a waste product and not a manufactured manure; it is only roughly graded, and the stated guarantees allow a wide margin for variation. Farmers must therefore exercise due caution in purchasing it, and satisfy themselves that it really contains the proper amount of potash and also that it is reasonably free from deleterious substances, such as cyanides, sulphocyanides, etc. These substances are not always present, and in any case they tend to lose their harmful character in the soil after a time, so that if applied in winter they would probably cease to be injurious before spring; in the meantime they may have some insecticidal value. Some samples also cause loss of ammonia when mixed with sulphate of ammonia.

Flue dust interacts to some extent with superphosphate, and therefore should not be mixed with it, especially if the mixture is intended to be kept.

Potash in Liquid Manure.—It cannot be too strongly urged that all liquid manure should be saved and applied to the land—if for no other reason, because of its richness in potash. In the ordinary way very little potash is sold off from British farms. A 40-bush. crop of wheat contains only 12 lb. of pure potash (K_2O) in the grain, while it contains 32 lb. in the straw; a 40-ton crop of mangolds contains 400 lb. of potash in the roots and 150 lb. in the leaves; a 20-ton crop of turnips contains 110 lb. of potash. If the roots and straw are used on the farm most of the potash passes into the manure, as the animal retains very little. For every hundredweight of flesh laid on a fattening animal only keeps back 2 oz. of the potash from its food; all the rest is excreted. Even milking stock do not take very much: 1,000 gal. of milk contain only 16 lb. of potash. The remainder—and it is by far the greater proportion—passes into the manure; very much of it occurs in the liquid, and is therefore liable to drain away. Hendrick has shown that 1,000 gal. of liquid manure contain nearly 50 lb. of potash, equivalent to that present in 3 cwt. of kainit. In addition there is about 20 lb. of nitrogen, equivalent to that present in 100 lb. of sulphate of ammonia, and also there is a little phosphoric acid. Dairy farmers have, perhaps, the greatest need to look to their liquid manure arrangements, as they feed so many mangolds and use so much less litter than farmers who fatten bullocks. Excellent results have been obtained on dairy farms by conserving the liquid manure and applying it to the grass land, or, of the soil is suitable, to the mangold land; it can be put on to arable land any time during the winter and there is little danger that it will wash away, as the soil absorbs the most valuable constituents and holds them till the plant needs them. Dairy farmers possessing drains and a manure tank would do well to see that these are in order and to make full use of the liquid collected.

Basic Slag on Arable Land.—Farmers are much more familiar with the use of basic slag on grass than on arable land. It may be pointed out, however, that basic slag is quite suitable for many arable crops. For sainfoin and lucerne a dressing of about 5 cwt. of slag per acre can be applied now; a similar dressing may be put on to the root land as soon as the ploughing has been done.

Economy in the Use of Seed Grain.[*]

OWING to the Nation's serious need of cereal foodstuffs farmers are urged to take every precaution in the selection and use of their grain for seed purposes. The harvest has been a bad one, and consequently much damaged wheat and other grain will be sown for the production of the 1918 crops. A poor germinating capacity can be compensated for to some extent by increasing the seed rate. But where the germinating capacity is low the growth energy of the seed is often defective, so that, in order to secure a satisfactory crop, the increase in the seed sown may have to be considerable. This entails the waste of valuable foodstuffs. It would often be more economical to the farmer, and it would certainly tend to husband our cereal resources, if he would do all in his power to procure seed grain in good condition instead of sowing excessive quantities of poor grain. With grain at its present prices the value of the extra quantity of home-grown seed would go far towards purchasing a sound supply of seed.

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[*] Issued as Food Production Leaflet No. 26.

There is, however, a decided tendency amongst farmers to increase the sowing per acre by an amount greater than is really necessary. The figures in the table below show the approximate amount of additional seed (in bushels) that should be sown per acre for samples with various capacities of germination.

Table showing the additional Seeding required when Samples of Poor Germinating Capacity are used for Sowing.

Germinating Capacity of Sample.	Normal Seeding in bushels per acre.					
	1½	2	2½	3	3½	4
	Additional Seeding required per acre.					
90 per cent.	¼	¼	¼	¼	½	½
80 ,, ...	½	½	½	¾	1	1
70 ,, ...	¾	¾	1	1¼	1½	1¾
60 ,, ...	1	1¼	1¾	2	2¼	2¾

It will be seen from the above table that a considerable addition to the seeding per acre is necessary in the case of cereals with a germination as low as 60 per cent. If, for instance, wheat with a germination of 60 per cent. is used it would, in order to sow the equivalent of 2 bush. of sound grain, be necessary to add ¼ bush. to the seeding per acre, making a total of 3¼ bush. to the acre; with a sample germinating 80 per cent. an addition of two pecks would, however, suffice. It is almost impossible by inspection of a sample of poor grain to estimate its germinating capacity within 10 per cent. or even 20 per cent. This can only be done by a germination test. The results of the test will give the farmer a fair idea as to whether the sample is fit to sow, and in this event what reasonable addition he should make to his sowing per acre. Farmers are, moreover, urged to procure really reliable seed grain rather than depend upon increased sowings of any poorly harvested grain that they may have ready to hand.

It is, of course, necessary that the farmer should ascertain the germinating capacity of his grain before he can decide with any degree of accuracy what addition he ought to make to his sowing.

It is desired, therefore, to bring to the notice of farmers the fact that a Seed Testing Station has been opened by the Food

Production Department, where farmers may send their seeds to be tested on payment of a fee of 3*d.* per sample. A sample in the case of cereals should consist of not less than 4 oz.

All samples should be addressed as follows :—

The Director-General,
Food Production Department,
72, Victoria Street,
London, S.W. 1.

and marked in the top left-hand corner of the envelope, "Seed Testing Station." Single samples, if properly addressed as above, need not be stamped. Farmers may obtain proper envelopes for sending their samples to the Station on making application to the above address.

For further information with reference to the testing of seeds at the Seed Testing Station, application should be made for Food Production Leaflet No. 18 (*The Testing of Seeds for Farmers at the Official Seed Testing Station*), which will be issued in January, 1918. In addition to the Testing of Seeds Order, 1917, as to the sale of seeds in this country, this leaflet will contain full particulars as to the method of taking samples, and also general hints on the purchase of seeds.

Ensilage.

ENSILAGE is a means whereby green fodder can be stored in a succulent condition for winter feeding. It was suggested some years ago that this practice might generally take the place of hay-making; but English experience has shown that this is not a profitable substitution except in very wet seasons or climates. The modern idea is to take silage in place of part of the root "break," especially on those soils which are not particularly favourable to the growth of roots, and to use the silage crop as a cleaning crop. Thus silage may be grown upon clay land, which is too risky for roots or too heavy for folding, and followed by wheat in autumn; or it may be grown upon very light soil with a dry climate during the seeding period where roots so often fail. Preferably the silage crop should be sown in autumn, and ensiled in the following July, after which the land would be cleaned, and perhaps cropped with late turnips, rape or mustard in August, or, in the absence of rain at this period, left for autumn corn. Almost any green crop can be successfully made into silage provided air is excluded from the fermenting material.

Under English conditions of climate a mixture of oats and tares, together with a few beans, will generally give the best results. It provides a well balanced feed; and the crop, owing to the presence of the leguminous plants (tares and beans) in the mixture, does not tend to impoverish the soil as would an exclusively cereal crop. Moreover, on account of the density of the oat and tare foliage, weeds are generally kept in subjection until the crop is harvested. The best time to sow the crop as a rule is during the last week in September or the first half of October. Owing, however, to the scarcity and high cost of tares, it is probable that less winter silage crops than usual have been sown, in which case a special effort should be made to sow suitable crops in spring. Peas may, to some extent, replace vetches for this purpose.

The preparation of the ground, provided it is not particularly foul, is a simple matter. Tares do not appreciate a deep seed-bed, consequently the land should be ploughed to a shallow depth only. The quantity of seed need not be great; 4 or 5 pecks of tares or peas (or a mixture) with about 8 or 10 pecks of oats to support them is ample: but if sowing is delayed, then greater quantities should be sown. Manuring should be directed chiefly to stimulating the growth of the leguminous crops. If the land is in fair condition, about 5 cwt. of basic slag is all that is required upon heavy land and 3 cwt. of superphosphate with 2 cwt. of kainit or its equivalent on light soils deficient in potash. These manures should be applied at seed-time. If the land is in low condition, a dressing of dung may be ploughed in before sowing. Failing this, 1 cwt of nitrate of soda or sulphate of ammonia should be applied in spring in addition to the artificials mentioned above.

Oats and tares should be cut for silage when the first formed pods on the tares begin to be dented by the seeds and when the oats come into milk. If the crop is left later, the straw becomes somewhat fibrous and indigestible, and it is more difficult to pack the silage tightly enough to exclude air from the silo. A good crop of oats and tares will yield as much as 12 or 15 tons of green stuff per acre.

In America maize is generally recognised as being much the best silage crop. Under English conditions it is not so satisfactory. It is true that great crops (30 to 40 tons per acre) can be grown; but generally the maize does not ripen sufficiently, and it is very sappy when cut. Consequently, under the pressure of silage, much of the juice is squeezed out of the silage and wasted, and the resulting silage is "sour," and very unpleasant to handle, though still a useful food. Nevertheless, in districts where soil and climate are early, and when early varieties are chosen, maize may prove a valuable silage crop. Loss of sap in the silo may be diminished if a layer of chaffed straw is placed at the bottom of the silo. If it is possible to make first cut clover into hay, it is generally better practice to do so; but second crops of clover in wet late seasons may usefully be made into silage. Mustard, rape and other cruciferous crops have generally been found in America to produce unsatisfactory silage.

Growing Broad Beans with Potatoes.

THE old system of growing broad beans among potatoes is worthy of consideration at the present time. During the past season there have been numerous cases of successful crops with this association.

The important points to observe are as follow:—

(1) The variety of potato should be a "first early," or at least an early or "second early," and not a variety producing rank haulm.
(2) The broad beans should be placed between the potato sets at the time the potatoes are planted.
(3) The tops should be pinched out of the beans as soon as pods are set at five nodes.

When the beans are planted in the same row as the potatoes they may be put in every row, and in the case of early potatoes closely planted—two beans between each plant.

This season Mr. Gardiner, of Croydon, grew a good crop of beans amongst early potatoes, the latter producing a crop of about 16 tons per acre.

Club Root.

THE disease known as club root or finger-and-toe (see Leaflet No. 77) appears to be becoming more general. It is caused by a minute living organism which occurs in infected soil and gains entrance to the seedling plants through delicate hairs on their roots. If protection is given to the seedlings and to the young transplanted plants, the attack of the disease may be warded off. To give this protection it is essential that the seedlings should be grown in soil which is known to be free from club root; and in those cases where soil is known to be infected the seed-bed must be sterilised. This should be done either by heating the soil, or if that is impracticable, by a very thorough liming of the soil with quicklime.

This should be added in powdered form to the soil at the rate of from ¾ lb. to 1 lb. to the square yard, and dug in. This should be done in the autumn, well in advance of the sowing period, though so long as the lime is applied two or three weeks before planting, no harm will result when the plants are put in. Similarly, liming of the soil in which the crop is to be grown will, if it is done thoroughly, eradicate the pest. Unless free from the pest, land should not be used for growing plants of the cabbage tribe.

Where gas lime is obtainable, this material may be employed for the same purpose as quicklime, but in that case the soil must not be planted for two months afterwards. It is most important that growers should understand that seedlings, although they may not show much (or any) sign of the disease may, if they have been raised on infected ground, be already attacked by the disease; and, if such seedlings are planted on uninfected land, they will of a certainty cause that land to be infected with club root. It is, therefore, desirable that those who intend to purchase seedling plants of the cabbage tribe for transplanting should not do so unless they are sure that the seedlings are from uninfected land. The presence of small nodules on roots shows the infection in an early stage; and under no circumstances should diseased plants be either planted or allowed to lie on cultivated ground, but should be burnt forthwith. Besides cabbages, turnips, swedes, mangolds, kohl rabi, lettuce, cauliflower, broccoli and savoy are all liable to attack. Those who use quicklime for the purpose of freeing the soil from club root must remember that this substance is caustic and will burn hands or clothes unless proper precautions are taken: The lime should be spread on a still day and dug in at once. The quicklime should be purchased as quicklime, and must be finely ground. If lumpy, it is of no use; and it must be kept in a dry place

Women Threshers.

IN view of the innumerable testimonies received during the past few months as to the utility of women labour in tractor and horse ploughing and threshing work, as well as in the lighter forms of farm labour, it is astonishing that there should still be some farmers who refuse to employ women for one or other of these objects. Some time ago the Food Production Department asked the Threshing Machine Owners' Association to form gangs of from 4 to 6 women to work with their threshing outfits. The members of the Association willingly agreed and have most loyally carried out their arrangements. It was reported from Lancashire at the end of November that "some farmers have declined to employ women or refuse to have a machine with gangs of women attached, preferring to engage competing owners of tackle from districts where such an arrangement is not in force." This objection does not end with the foolish prejudice against women; it affects the amount of male labour available on the farms for field work. The visiting outfits ask for help from the farmers of the neighbourhood, and ordinary labourers are withdrawn from their customary duties whilst threshing is in progress. The Executive Committee for Lancashire are determined not to encourage this sort of thing and have issued notices to the Press that no farm workman who has received exemption from military service is to perform casual work in connection with the threshing machines; that farmers must avail themselves of the services of the women workers who have been allotted to the sets. Any farm worker who disregards this notice does so at the risk of having his certificate of exemption withdrawn.

Public School Boy Labour.

IT will be remembered that last year and still more largely this year, Public School boys were employed during the summer and autumn to assist the farmer in keeping his crops clean and eventually harvesting them safely. Broadly speaking, the scheme of employing these lads was a great success: indeed, not a single complaint was received at the Food Production Department concerning any of the numerous camps or gangs. It is generally felt that this source of labour should be utilised to the fullest possible extent during 1918, and already arrangements are being put in hand for this purpose. At the Gloucester Executive meeting recently the question of Public School boy labour was considered, representatives of the Public Schools being present. The latter expressed themselves anxious to know if the farmers were satisfied with the work done by the lads this year and if there was likely to be a demand for them should they be available during the Easter holidays. It was stated that the Committee have received many letters from farmers stating that this class of labour was thoroughly satisfactory and that they hoped to obtain a liberal supply of it next year. Accordingly, Mr. T. W. Chambers, one one of the Inspectors under the Board of Education, has been asked to organise this branch of work in conjunction with representatives from each district committee concerned.

Country Crèches.

THE subject of country crèches has come up as an inevitable result of the employment of women on the land. Now that every able-bodied country woman is being pressed into the urgent service of food production, the care of her children calls for attention. Experiments in crèches are therefore being started.

In Holbeach, Lincolnshire, one has been working since the early spring, having an average attendance of 20 children per day. Sixpence is charged here for one child, and fourpence per head where there is more than one child from a family. This sum would be higher than many women could afford, but a crèche could be run on a lower fee, especially in the summer, when heating has not to be provided. In Kent, an enterprising farmer had a small enclosure made out of sheep gates under some shady trees on his farm and there collected all the children his workers had brought; he paid a village woman (past active service) to look after them, and provided milk and biscuits for the 10.30 a.m. lunch, so that the mothers could work on uninterruptedly until dinner-time came, when they sorted out their own children and all dined together. The children were returned to the "fold" for the afternoon. The farmer declared that the small outlay involved in caretaker's wage and the milk was returned to him many times over by the increased amount of work the women were able and willing to perform

The Women's Branch of the Food Production Department is taking up this question; and suggestions will be put forward by them to assist in the formation of crèches wherever they are necessary.

Syrup from Small Quantities of Sugar Beet.

IN a Farmers' Bulletin (No. 823) the United States Department of Agriculture describe a simple process of making an edible syrup from sugar beet. The process described is suitable for home use and is said to have proved practicable.

Thirty to forty beets (1 bush.) are trimmed and their crowns are cut off at the lowest leaf scar. The "roots" are then thoroughly washed and scrubbed with a stiff-bristled brush, cut into very thin slices and put into a barrel. Ten gal. of boiling water are added, the barrel is covered over to keep in the heat, and the beets are allowed to soak for an hour with an occasional stirring. The liquid is then drawn off, strained through several thicknesses of cheesecloth and boiled down slowly to a volume of from 3 to 5 qt (*i.e.*, to about $\frac{1}{10}$th of its volume). Whilst the liquid is boiling, the surface must be carefully skimmed in order to remove the scum which arises to the surface; when reduced to the proper bulk the hot liquid should be put into bottles or cans, which are sealed or corked to prevent the growth of mould.

The syrup is dark in colour, wholesome and nutritious, and may be used for all purposes for which other dark-coloured syrups are used, such as the making of dark-coloured cake.

Value of Basic Slags of Varying Solubility.

MR. A. W. OLDERSHAW wishes to point out that the experiments conducted by him, particulars of which were published in the November issue of this *Journal*, deal solely with the results obtained in Suffolk, *i.e.* in a dry climate and with a very short growing season for grass. The question of the value of slags of varying degrees of solubility in other parts of England and Scotland is not discussed.

It is worthy of note, however, adds Mr. Oldershaw, that Dr. E. J. Russell, Director of the Rothamsted Experimental Station, deals with this question in his work "Manuring for Higher Crop Production" (2nd Edition). An account is therein given of other experiments, under very different conditions from those prevailing at Saxmundham, and in several of these quite good results have been obtained from slags of low solubility.

OFFICIAL NOTICES AND CIRCULARS.

Register of Dairy Cows.

The Board propose to issue about April, 1918, the first volume of a Register of Dairy Cows in connection with their milk-recording scheme. *The objects of the register are :—*

1. To assist and encourage in England and Wales the breeding and improvement of dairy cattle of any breed, type or cross, by publishing annually particulars of cows which have been proved by certified milk records taken under the Board's milk-recording scheme, to possess high-class dairy qualifications.

2. To provide authentic records of high class dairy cattle with a view to bring sellers and buyers together.

3. To encourage the keeping and publication of particulars of cows *(including certified milk records) which in course of time would make it possible to establish a " Register of Cows with Milk Record Pedigrees " into which an animal of any breed, type, or cross, would be admitted, provided that a specified number of its female ancestors possessed satisfactory milk records.

4. To record particulars of the breeding of cows, entered in the register, with a view to encourage the use of pedigree bulls for grading up non-pedigree herds so that they may become eligible for recognised herd books in due course.

The first volume will cover the year ended 30th September, 1917, and *the conditions of registration are :—*

(1) Registration is optional.

(2) Registration is free of cost to the cow-owner

(3) A cow of any breed, type of breed, or cross can be registered, but only if she has been awarded the Board of Agriculture and Fisheries' certificate or certificates to prove that she has yielded not less than 8,000 lb. of milk during the Milk Recording Society's year of operations ending on 30th September, 1917. (*In subsequent years a cow will also be eligible for entry in the register if she has yielded not less than 6,500 lb. of milk, on an average of two or more consecutive years of a Milk Recording Society's year of operations, but for this purpose no records taken prior to 1st October, 1916 will be recognised.*)

(4) The Board reserve the right either to refuse to register or to remove from the register any cow without stating their reasons for so doing.

(5) The Board do not hold themselves responsible for any loss or damage incurred should the Board refuse to register a cow or should they remove a cow from the register, or should any inaccurate statements appear on the register.

(6) Application for registration will be accepted in respect only of cows for which milk record certificates have been issued for the year to which the register relates.

(7) No application for registration in the first volume will be accepted after December, 31st, 1917.

(8) Conditions of entry are subject to alteration or amendment by the Board.

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* The term " cows " includes " heifers."

Training of Horse Ploughmen.

THE following Memorandum (No. 2/L. 2), dated the 8th November, 1917, has been addressed by the Food Production Department of the Board to the Secretaries of the Agricultural Executive Committees :—

Many of the Executive Committees have now established schools for the training of horse ploughmen, in accordance with paragraph 11 of the training scheme (F.P. 118), and other counties have sent men out to be trained by farmers under paragraph 10 of the scheme. The Department hope that a school or schools will be established in every county, as in this way the men can be trained with the horses they will be sent out with under the horse scheme (F.P. 92), and a closer control is kept over the subsequent movements of the men. The sending out of men to be trained by farmers should be considered as merely supplementary to the school, and adopted in order that the number of men under training may be largely increased.

If your Committee, in view of the urgent need of ploughmen, are in a position to increase the number of men under training at the schools, the Department can at once arrange to provide any additional horses, harness and implements required.

Horse Purchase Scheme.

THE following Memorandum (No. 3/L. 2), dated the 21st November, 1917, has been addressed by the Food Production Department of the Board to the Secretaries of the Agricultural Executive Committees :—

It is apparently not clearly understood that when horses have been taken over by Agricultural Executive Committees, the animals cannot be returned to the Remount Depôts.

Each Committee must arrange for stabling in order to accommodate sick horses, or horses waiting to be employed, the Remount Depôts being in no way responsible for providing such stabling.

The Department should be informed at once if Agricultural Executive Committees are unable at any time to employ horses allotted to them in order that they may be transferred for employment in another county

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Horse Scheme, F.P. 92.

THE following Memorandum (No. 5/L. 2), dated the 30th November, 1917, has been addressed by the Food Production Department of the Board to the Agricultural Executive Committees :—

In order to meet difficulties that have been pointed out by several Committees the Department authorise Agricultural Executive Committees to work the gang system as outlined in Part B of F.P. 92 on the basis of an acreage, instead of a daily, payment, *if, in their opinion, it is essential to do so in order to get grass land ploughed and the result can be obtained in no other way*. This acreage system is not intended to replace either horses on loan to farmers under Scheme A, or day work under Scheme B, but has been authorised solely with a view to assisting the small farmer who is afraid of having ploughing work done on a day-work basis owing to the uncertainty of the ultimate cost.

A form of contract to be used in connection with acreage work is attached.*

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* Not printed.

Committees should fix the detailed scale of charges for contract work in their county, subject to the following minimum prices for ploughing :—

Light land	.. 2 horse	.. .. ..	20s. per acre.
Medium ,,	.. 2 ,,	.. .. ..	25s. ,,
Heavy ,,	.. 3 ,,	.. .. ..	30s. ,,
,, ,,	.. 4 ,,	.. .. ..	35s. ,,

A scale of charges for subsequent operations, cultivating, harrowing, rolling, drilling, etc., on light, medium and heavy land, should be submitted by each Committee to the Department for approval.

In entering into contracts Committees must bear in mind that the contract price per acre must approximate to the cost of the gangs to the Department. Committees should make it clear to farmers that on the average "per acre" work must prove somewhat more expensive than day work; as they take all risks they are obliged to charge at somewhat higher rates for ploughing by the acre than for ploughing by the day.

The attention of Committees is drawn to the urgent need for the nomination of a Horse Officer if such nomination has not already been made. In view of the large number of tractors expected to be sent to the various counties, machinery officers will not be able to spare time to organise the horse scheme, and horse officers will become essential as more and more horses are employed. Preparations should, therefore, be made to deal with the additional work involved.

Work of District Committees.

THE following Memorandum (No. 4/C. 1), dated the 22nd November, 1917, has been addressed by the Food Production Department of the Board to the Secretaries of Agricultural Executive Committees :—

The following scheme has been adopted by a District Committee in one of the Eastern counties for securing a close inspection of all the farms in the district, and the Department wish to commend it to the consideration of Executive Committees as a good example which might be adopted with advantage by other District Committees throughout the country.

Visit every farm and arrange as far as possible to get 70 per cent. cropped with corn and potatoes or carrots. If no carrots are grown 65 per cent. corn and potatoes. On warp land not less than 75 per cent. corn and potatoes.

Take particulars of all foul land, not fit to sow as above, and state what cultivations should be effected in order to get a root crop next summer.

Take acreage of land where corn will follow a corn crop.

Arrange with the farmer to dress such land with not less than 35s. worth of artificial manures to the acre. (Suggestion, 1 cwt. of sulphate of ammonia and 3 cwt. of superphosphates per acre.) This is only to apply to top land where necessary, and not to rich warp land.

Note the acreage of crops harvested in 1917, and the acreage which the tenant proposed to sow for 1918 harvest.

Carefully inspect watercourses and drains, and report on any which require attention.

Schedule further suitable grass land for conversion into arable.

Report on the labour on the farm, and how employed. Further impress on all farmers the necessity of keeping the tribunal exemptions of their men active, and acquaint them fully with the course they should pursue, so that their men shall be retained in agricultural employment.

The following particulars should be impressed on every farmer :—

Where exemption exists, appeal must be made before the expiration of this exemption.

Where a youth attains the age of 18 whilst in a farmer's employ, he must report to the recruiting officer immediately and the employer must lodge his claim at once

Where the employee moves from one farm to another, this fact must be reported at once to the Recruiting Officer, and to the Secretary, War Agricultural Committee

Make general remarks on the condition of each farm, with recommendations as to the cultivations and improvements necessary. The Committee must impress on each tenant the seriousness of the position.

Endeavour to obtain from each farmer an increased acreage of either autumn or spring wheat.

The above inspections are to be completed by 22nd November, so that the forms may then be considered by the Executive Committee.

Charges for Tractor Ploughing.

THE following Circular Letter (No 6/M. 6), dated the 22nd November, 1917, has been addressed by the Food Production Department of the Board to the Secretaries of the Agricultural Executive Committees :—

SIR,—In the final paragraph of the Department's Circular Letter of 3rd October last, reference was made to the charges to be made for the ploughing of land by Government tractors. It was stated that, in view of the rise in cost of fuel and labour, contracts for ordinary ploughing should not be made at less than 20*s*. per acre, and that when the depth of the furrow exceeded 6 in in grass or 7 in. in stubble, or fallow, an extra charge at the rate of 2*s*. 6*d*. per inch of additional depth should be made.

Representations have since reached the Department from several districts stating that it is the custom to plough certain classes of land to lesser depths than those mentioned in the Circular, and that when the soil is light and open in texture and the ploughing shallow, a speed can be attained which would enable the Department to reduce its charges without risk of loss.

Your Committee will, no doubt, recognise the danger of a scale of charges which might unduly encourage shallow ploughing to the detriment of food production, and the Department do not propose to adopt a scale of reduced charges per inch of decreased depth parallel to the scale adopted for specially deep ploughing. At the same time the Department are aware that there are cases in which tractors might be used advantageously for shallow ploughing, and they authorise me to say that when the Committee are satisfied that shallow ploughing would appear to be in the interests of food production contracts may be entered upon for the ploughing of light soils to a depth not exceeding 5 in. (and the skimming of stronger soils to a depth not exceeding 4 in) at a charge of 17*s*. 6*d* per acre.

I am, etc.,
H. L. FRENCH,
General Secretary.

Agricultural Land in County Boroughs.

THE following Circular Letter (No. 1/C. L.), dated the 8th November, 1917, has been addressed by the Food Production Department of the Board to the Secretaries of Agricultural Executive Committees :—

SIR,—I am directed to inform you that the Board have had under consideration the question of applying the powers of Regulation 2M of the Defence of the Realm Regulations to agricultural land in County Boroughs. As your Committee are aware, the jurisdiction of the Executive Committees under the Cultivation of Lands Order, 1917 (No. 3) does not extend beyond the Administrative County, and thus an area of land which, in the aggregate, must amount to a considerable figure has hitherto remained outside the scope of the Order, while the powers conferred by Regulation 2L, and delegated to urban authorities under the Cultivations of Lands Order, 1917 (No. 2), are not adequate in all cases to secure the proper cultivation of land that is not making its due contribution to the nation's food supply.

With the view of remedying this, the Board put before the Councils of County Boroughs certain suggestions which are set forth in the accompanying copy of a Circular Letter, dated 17th August, 1917, and they have now made an Order entitled "The Cultivation of Lands (County Boroughs) Order, 1917," a copy of which with a copy of the covering letter is sent herewith for the information of your Committee.

I am to suggest that the Executive Committee should place themselves at once in communication with the Councils of the County Boroughs that are contiguous to the Administrative County for which the Committee is responsible, with a view to the Sub-Committee being appointed to act in relation to agricultural land situated within the boundaries of the borough. In cases where the acreage of such land is small, it may not be deemed necessary to take any action ; but in other instances, the Board would suggest the desirability of setting up the machinery for dealing promptly with any case that may call for the exercise of the powers with which your Committee is entrusted.

The Order is being printed, and further copies will be circulated in due course.

I am, etc.,
F. L. C. FLOUD.

THE following Circular Letter (No. 2/O. 1), dated the 8th November, 1917, has been addressed to the Town Clerks of the Councils of County Boroughs in England and Wales :—

SIR,—The Board have received and considered the replies to their Circular Letter of the 17th August last,* as to the application of the powers of Regulation 2M of the Defence of the Realm Regulations to land situated within the boundaries of County Boroughs, and they have now made an Order under that Regulation entitled "The Cultivation of Lands (County Boroughs) Order, 1917," a copy of which is enclosed for the information of your Council.

It will be observed that the Order enables the jurisdiction of the Executive Committee appointed for an Administrative County under the Cultivation of Lands Order, 1917 (No. 3) to be extended to land situated within a county borough, provided the consent of the Borough or City Council is obtained. The scope of the powers exercisable under the last mentioned Order, and the manner of their exercise, are indicated in the accompanying copies of that Order, and of the Department's Circular Letters dated 23rd January, 1917, and 23rd March, 1917.

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* Printed below.

In deciding what form the new Order should take, the Board have been guided to a large extent by the fact that the great majority of the Councils of County Boroughs have accepted, without qualification, the suggestions made in their letter, dated 17th August, 1917, while, of the minority, the greater number have agreed to those suggestions in principle, though desiring certain modification in the procedure for carrying them into effect

The Order has been so framed as to leave to the Council of each County Borough the option of deciding whether or not the Order shall become operative so far as that County Borough is concerned. The objections to any deviation in particular cases from what has been decided to be the most satisfactory arrangement, and the one that has secured almost universal consent will be obvious. The Board hope, therefore, that, on further consideration, those few County Boroughs that would have preferred some different arrangement will see their way to withdraw their objections, and to co-operate with the County Executive Committee in taking all possible steps to secure that any agricultural land in the County Borough shall make its proper contribution to the food supply of the country. In cases where the acreage of such land is small it may not be deemed necessary to take any action, but in other instances the Board would suggest the desirability of setting up the machinery for dealing promptly with any case that may call for the exercise of the powers with which Executive Committees are entrusted.

Drainage of Lands Order, 1917.—A copy of the Drainage of Lands Order, 1917, is also enclosed, by which certain powers are given to County Executive Committees for securing the cleansing of watercourses and for regulating the flow of water through mills, etc. These powers are given purely for the purpose of improving the drainage of agricultural land and have no bearing upon sanitation or public health. But there are certain cases of watercourses draining agricultural land which flow for a portion of their length through the area of a County Borough , and where such a watercourse exists the County Borough Council, may think it advisable to give their consent to the exercise of these powers within their area. If, however, the County Borough Council do not desire to do so, that need not deter them from giving their consent to the exercise of the powers conferred by the Cultivation of Lands Order, 1917 (No. 3) ; for it will be noticed that the Cultivation of Lands (County Boroughs) Order, 1917, makes it possible for the County Borough Council to give their consent to the exercise within their area of any of the powers enjoyed by the Agricultural Executive Committee in the county. and not necessarily to the exercise of all of those powers.

Other Orders.—Other powers given to Agricultural Executive Committees either appear inappropriate to County Boroughs or are already exercisable by the County Borough Councils themselves, such as the Rabbits Order, 1917, and the Sale of Horses Order, 1917.

Copies of the Order of 23rd October, and of this letter as well as that dated 17th August last, have been sent to the Agricultural Executive

Committee for each county, and it is left to your Council, in consultation with the Executive Committee(s) for the county or counties contiguous to the Borough to make such arrangements as may be mutually agreed upon for carrying the Order into effect, and generally for securing the cultivation of all agricultural land in the county borough in the manner that will best serve the national interests in the present crisis.

The Order of 23rd October is being printed, and further copies shall be sent in due course if required.

I am, etc.,
F. L. C. FLOUD.

ENCLOSURE

Cultivation of Lands (County Boroughs) Order, 1917, dated 23rd October, 1917, made by the Board of Agriculture and Fisheries.

The Board of Agriculture and Fisheries, after consultation with the Food Controller, in exercise of the powers conferred on the Board by Regulation 2M of the Defence of the Realm Regulations do hereby order as follows:—

1. The body constituted by the Cultivation of Lands Order, 1917, (No. 3) for any Administrative County, acting through their executive committee, may with the consent of the council of any county borough which is surrounded in whole or in part by the county, exercise within the county borough the powers which the body so constituted is by any Order made by the Board under the Defence of the Realm Regulations authorised to exercise within the county or any of such powers, and for the purposes of the exercise of the said powers within the borough the Executive Committee and the council of the borough may appoint in such manner as may be agreed a committee to act as sub-committee of the Executive Committee, but all acts of the sub-committee shall be submitted to the Executive Committee for their approval.
2. This Order may be cited as the Cultivation of Lands (County Boroughs) Order, 1917.

IN WITNESS whereof the Board have hereunto set their Official Seal this twenty-third day of October, nineteen hundred and seventeen. (L.S.)

(Signed) F. L. C. FLOUD,
Assistant Secretary.

ENCLOSURE.

Circular Letter, dated the 17th August, 1917, from the General Secretary of the Food Production Department of the Board to the Councils of County Boroughs in England and Wales referred to in the Letter (No. 2/O. 1.) above:—

SIR,—I am directed to inform you that the Board have had under consideration the procedure to be adopted for securing the proper cultivation of agricultural land which is situated in County Boroughs.

Powers have already been conferred on the Councils of County Boroughs by the Cultivation of Lands Order, 1917 (No. 2), under which the powers of the Board under Regulation 2L of the Defence of the

Realm Regulations have been delegated to the Councils, and considerable use has been made of these powers for the purpose of providing land for allotment cultivation. But it has been represented to the Board that these powers are insufficient to deal with the larger question of dealing with insufficiently cultivated farms, and that for this purpose it is desirable that the powers of Regulation 2M of the Defence of the Realm Regulations should be available.

The powers of Regulation 2M have been delegated to Agricultural Executive Committees in each county, but the jurisdiction of those Committees extends only to the Administrative Counties, and consequently does not enable the Committees to deal with land situated within the county boroughs.

The Board have considered whether the powers of Regulation 2M should be conferred on the Councils of County Boroughs, but they have come to the conclusion that there are serious objections to this course for the following reasons :—

(*a*) The area of agricultural land in the County Boroughs is, comparatively, so small that it appears unnecessary and uneconomical to set up over 70 additional Executive Committees in order to deal with it.

(*b*) It is essential that any body to whom the powers of Regulation 2M are entrusted should be composed of practical agriculturists, and in most County Boroughs it would be difficult to obtain the services of men with the requisite knowledge and experience.

(*c*) It is very desirable to avoid the additional administrative cost which would be involved by setting up Executive Committees in each county borough with a separate office and staff.

(*d*) The powers conferred by Regulation 2M cannot be carried out effectively unless the body exercising them is in a position to assist farmers by supplying them with labour or machinery and by organising the supply of fertilisers, etc. The County Agricultural Executive Committees act as the local agents of the Board for the distribution of any soldier labour placed at the disposal of the Board by the War Office, they are responsible for preparing programmes of work for the motor tractors which the Department have provided for the use of farmers, and they undertake the organisation through the trade of the supplies of fertilisers, etc., required by the farmers. It would not be practicable for more than one authority in each county to control these matters.

The Board are of opinion, therefore, that the most satisfactory course will be to extend the jurisdiction of the County Agricultural Executive Committees to include any agricultural land in the county boroughs within their counties, but at the same time the Board would welcome the co-operation of your Council in the work of increasing food production. I am to say, therefore, the Board would propose that any such extension of the jurisdiction of the County Committees should be subject to the proviso that any Council of a County Borough, if they so desire, may appoint a special Sub-Committee for the Borough to act under the Executive Committee for the County in regard to any agricultural land situated within the Borough. Such a Sub-Committee could be responsible for making inquiries as to the manner in which the land is cultivated and for recommending any steps which should be taken to remedy defects, leaving to the County Committee the duty of taking any action necessary under Regulation 2M. Under this arrangement it will also be possible for the farmers in County Boroughs to share in any help which the County Committee can give in regard to the supply of labour, the loan of horses, or the use of motor tractors.

The Board hope that these proposals will commend themselves to your Council. They are not intended to prejudice in any way the general principle that in ordinary matters of local administration the County Boroughs are independent of any other authority in the county. The Agricultural Executive Committees are not statutory bodies nor are they Committees of the County Council. They are solely responsible to the Board, who pay all their expenses, and they have been constituted as the most suitable local agents of the Board for the purpose of carrying out the proposals of the Government for increased food production in the present national emergency.

I am, etc.,
H. L. FRENCH,
General Secretary.

Cultivation of Land Orders: Withdrawal from Possession.

THE following Memorandum (No. 6/C. 1), dated the 27th November, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees—

Paragraph (4) of Regulation 2M has been amended by Order in Council, dated 16th November, 1917, and now runs as follows :—

> If the Board at any time withdraw from possession of any land of which possession has been taken under this Regulation, they may recover from *any person then interested in the land as owner or tenant or otherwise*, such amount as represents the value to him of all acts of cultivation or adaptation for cultivation executed by the Board; such amount to be determined, in default of agreement, by a single arbitrator under and in accordance with the provisions of the Second Schedule to the Agricultural Holdings Act, 1908.

It will be observed that under this paragraph when an Agricultural Executive Committee withdraws from possession of a piece of land of which possession has been taken on behalf of the Board under paragraph 1 (*a*) of Regulation 2M, the whole value of acts of cultivation or adaptation for cultivation done during the period of possession can be recovered Where a tenant comes into occupation on the Committee's withdrawal, the value to him of the tillages, etc., can be obtained from the tenant on the same basis as upon an ordinary change of tenancy; and the value to the landlord, mortgagee, or other person interested due to expenditure on such matters as repairs to buildings, making-up of fences, repairs of gates, mole-draining and so on (for which an incoming tenant would not ordinarily be liable) can be recovered from that person. Where the landlord himself resumes occupation, the whole value to him of the acts done can be recovered from him.

Agricultural Executive Committees are requested to bear the position in mind when putting forward schemes for taking possession of land or proposals for withdrawing from possession.

THE following Memorandum (No. 7/C. 1), dated the 27th November, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees:—

Growing of Strawberries and Bush Fruit.

The Agricultural Executive Committees of several counties have taken up questions connected with the planting and ploughing up of strawberry plants and bush fruit, and have dealt with these matters in different ways. The fruit-growing industry being a comparatively limited one, this difference of treatment may be unfair to the growers in one county as compared with another; and unless some uniformity of action is adopted they may have a legitimate grievance.

In view of the value of fruit for jam and other purposes, the Board do not consider it desirable that the acreage under strawberries or bush fruit should be reduced, but they think that restrictions might be imposed on the following lines in order to prevent an increase in the acreage and also secure intercropping with vegetables wherever practicable:—

1. No direction should be given to grub up strawberry plants or bush fruit.

2. No grower should be allowed to increase his total area under strawberries or bush fruit beyond its extent at the present moment; except that if any grower had less than one acre planted with strawberries or bush fruit for the 1917 crop, he may increase his area of strawberries or bush fruit up to one acre.

3 Where a grower grubs up any part of his strawberries or bush fruit he may plant with strawberries or bush fruit, as the case may be, an area equivalent to that grubbed up.

4. Where new land is planted under paragraph 3 two conditions must be observed :—

(*a*) The land from which the plants or bushes have been grubbed up must be planted with a food crop;

(*b*). The land newly planted with strawberries or fruit bushes must be interplanted with a food crop.

5. The food crop referred to in paragraph 4 need not be a crop of corn, roots or potatoes; any vegetable crop, such as carrots, which is of real value, may be grown between the rows of strawberries or bushes.

6. No objection should be taken to the planting of strawberries between standard or half standard fruit trees already existing as permanent plantations. In such cases, the direction in paragraph 4 (*b*) as to intercropping will not apply.

THE following Memorandum (No. 8/C. 1), dated the 3rd December, 1917, has been addressed by the Food Production Department of the Board to Agricultural Executive Committees in England:—

Growth of Mustard for Seed.

The Board have had under consideration the question of the extent to which mustard might be grown for seed next year, and they have come to the conclusion that, in view of the urgent necessity of securing the largest possible production of those crops which are most essential for human consumption, it would not be justifiable to devote to mustard for seed a larger acreage than 10,375 acres, which was the area returned as grown for seed this year.

Within this limit, however, the Board think that Agricultural Executive Committees might reasonably sanction contracts for the growth of mustard for seed, and the Board have arranged with Messrs. J. & J. Colman that the firm should supply particulars of the contracts they make to the Executive Committee of the county so that the Committee may be in a position to see that the acreage contracted for does not exceed the acreage returned as grown in 1917.

The Board have suggested to Messrs. J. & J. Colman that as far as possible their contracts should be made with farmers who are ploughing up grass land which is too rich in fertility for cereals as a first crop, and have reminded them that it would be well to confine their contracts to such land in order to obviate the risk of contracts on fine corn land being cancelled in case of shortage of food.

A statement is annexed* showing the acreage returned in 1917 as devoted to mustard for seed in each county.

An Order (No. 1157) dated the 10th November, 1917, has been made by the Food Controller to the effect that:—

The Oats Products (Retail Prices) Order, 1917.

1. *Maximum Prices for Oat Flour and Oatmeal.*—No person shall, on or after the 26th November, 1917, sell, or offer, or expose for sale, or buy, or offer to buy by retail any oat flour, oatmeal, rolled oats, flaked oats or other like products of oats at prices exceeding the maximum prices applicable thereto according to the following table.—

Place of Sale	Oat Flour.		Oatmeal, Rolled Oats, Flaked Oats or other like Products of Oats.	
	For every 7 lb included in the Sale	Rate per lb for any Quantity less than 7 lb included in the Sale	For every 7 lb. included in the Sale	Rate per lb for any Quantity less than 7 lb. included in the Sale.
	s. d.	d	s. d.	d.
Scotland and the Counties of Northumberland, Durham, Cumberland, Westmorland, Lancashire, Yorkshire and Cheshire	2 3½	4	2 0	3½
All other parts of the United Kingdom	2 6½	4½	2 3	4

2. *Bags and Packages, etc.*—The maximum price shall include all charges for bags and other packages, and no additional charge shall

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* The statement is not here printed, but the total shown for the 48 divisions included is 10,375 acres.

be made therefor. No extra charge may be made for giving credit or for making delivery.

3. *Proprietary Brands.*—Except in such cases as the Food Controller may otherwise determine, this Order shall apply to proprietary brands of the articles mentioned.

4. *Contracts.*—Where the Food Controller is of opinion that the price payable under any contract subsisting at the date of this Order, for the sale of any oat flour, oatmeal, rolled oats, flaked oats or other like products of oats, is such that the same cannot at the prices permitted by this Order be sold by retail at a reasonable profit, he may, if he thinks fit, cancel such contract, or may modify the terms thereof in such manner as shall appear to him to be just.

5. *Meaning of Oat Flour.*—In this Order "Oat Flour" means only such oat flour as will pass through a silk or wire sieve having not less than 48 meshes to the inch.

6. *Fictitious Transactions.*—No person shall, in connection with the sale or disposal, or proposed sale or disposal of any oat flour, oatmeal, rolled oats, flaked oats, or other like products of oats, enter or offer to enter into any fictitious or artificial transaction, or make or demand any unreasonable charge.

7. *Infringement.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

8. *Revocation.*—The Oats and Maize Products (Retail Prices) Order, 1917, as amended by the Oats and Maize Products (Retail Prices) No. 2 Order, 1917, is hereby revoked so far as concerns oat flour, oatmeal, rolled oats, flake oats and other like products of oats as from the 26th November, 1917, but without prejudice to any proceedings in respect of any contravention thereof.

AN Order (No. 1155), dated the 12th November, 1917, which came into force as from the date of the Order, has been made by the Food Controller to the following effect:—

The Seed Potatoes (1917 Crop) Order, 1917.

1. *Application of this Order.*—The provisions of this Order shall apply only to seed potatoes dealt in as or for seed. All other dealings in potatoes shall be subject to the provisions of the Potatoes Order, 1917.

2. *Definitions.*—For the purposes of this Order the following expressions shall, except where the context otherwise requires, have the following meanings:—

"A Wholesale Seed Dealer" means a person for the time being authorised under the Potatoes Order, 1917, to sell potatoes as or for seed by wholesale.

"A Retail Seed Dealer" means a person for the time being authorised under the Potatoes Order, 1917, to sell potatoes as or for seed by retail.

"His Own Potatoes," with reference to a grower of potatoes means the potatoes grown by such grower.

"Seed Potatoes" means potatoes of the classes hereinafter mentioned and potatoes which under this Order are deemed to be seed potatoes.

"Class I." shall mean potatoes of the variety Arran Chief, grown in Scotland or Ireland in the year 1917, which will pass through a riddle having a 2½-in. mesh and will not pass through a riddle having a 1½-in. mesh, and potatoes of any other variety grown in Scotland or Ireland in the year 1917 which will pass through a riddle having a 2-in. mesh and will not pass through a riddle having a 1½-in. mesh.

"Class II." shall mean potatoes grown in England or Wales in the year 1917 from seed grown in Scotland or Ireland in the year 1916, which will pass through a riddle having a 2-in. mesh, and will not pass through a riddle having a 1½-in. mesh.

"Class III." shall mean potatoes grown in England or Wales in the year 1917 from seed grown in England or Wales in the year 1916 (such seed having been obtained from seed grown in Scotland or Ireland in the year 1915) which will pass through a riddle having a 1¾-in. mesh, and will not pass through a riddle having a 1¼-in. mesh.

3. *Certain Varieties may be Sold for Seed as Grown.*—(*a*) Notwithstanding the provisions of the Potatoes Order, 1917, potatoes of the varieties named in the First Schedule and of the first four varieties named in the Second Schedule, respectively, grown as mentioned in the definitions of Class I., Class II., and Class III., and potatoes of the varieties Evergood and Queen Mary, grown in Scotland or Ireland in the year 1917, may be sold "as grown" by the grower thereof, as or for seed: Provided that there shall be removed all large potatoes and all such potatoes as will pass through a riddle having a 1¼-in. mesh.

(*b*) Where any such potatoes are or have been sold "as grown" as or for seed, such potatoes shall, for all purposes, be deemed to be seed potatoes, and the class of such potatoes shall be determined in accordance with the definitions contained in Clause 2 of this Order except so far as such definitions relate to riddles.

4. *Maximum Prices on Sales of Seed Potatoes as or for Seed.*—Except where seed potatoes are sold as or for seed for export, a person shall not directly or indirectly sell, or offer or expose for sale, or buy or agree to buy any seed potatoes at prices above the maximum prices permitted by this Order.

5. *Maximum Price for Sales of Seed Potatoes specified in Schedule I.*—The price which may be charged on any sale as or for seed of seed potatoes of any of the varieties mentioned in the First Schedule shall not exceed the maximum price applicable under such Schedule according to the variety and class of potatoes sold.

6. *Grower's Maximum Price for other Seed Potatoes.*—The price which may be charged on a sale as or for seed of seed potatoes of the varieties referred to in the Second Schedule by the grower of the potatoes sold, shall not exceed £6 10*s.* per ton together with the addition of the sum (if any) mentioned in the Second Schedule applicable according to the variety and class of seed potatoes sold; except that where a grower sells quantities of 1 cwt. or less of his own seed potatoes of these varieties to persons buying for planting the price shall not exceed 1*s.* 3*d.* per stone, and such charges may be made for delivery as may, under this Order, be made by a retail seed dealer.

7. *Basis of Prices and Adjustments where the Basis is Varied.*—The maximum prices applicable under the last Clause are fixed on the basis

(i) that the potatoes are either loaded by the seller into trucks at the seller's railway station, or (at the buyer's option) into a ship or barge not less convenient to the seller than the seller's railway station, (ii) that bags (if required) are supplied by the buyer, and (iii) that no commission is paid. If the potatoes are delivered otherwise than as above, a corresponding variation shall be made in the price and in particular, if bags are supplied by the grower, the above-mentioned maximum price shall be increased by a sum of 10*s.* whether the bags are returnable or not, and if any commission is paid by the grower to a wholesale dealer not exceeding a commission at the rate of 7*s.* 6*d.* per ton the maximum price shall be increased by the amount of the commission.

8. *Wholesale Seed Dealer's Maximum Prices.*—(*a*) The maximum price which may be charged by a wholesale dealer on a sale as or for seed of seed potatoes of the varieties referred to in the Second Schedule shall be a sum not exceeding the cost to him of the seed potatoes so sold by more than 15*s.* per ton.

(*b*) No wholesale dealer shall after the 12th November, 1917, sell seed potatoes as or for seed as agent on commission at a commission exceeding 7*s.* 6*d.* per ton.

9. *Reckoning of Cost to a Wholesale Dealer.*—The cost of seed potatoes to a wholesale seed dealer for the purpose of the preceding Clause shall be reckoned as including the following items and no more, viz :—

(*a*) The price actually paid or payable by him for the potatoes, including the authorised charge for bags where the potatoes are bought by him already bagged.

(*b*) A sum not exceeding 10*s.* per ton for bags where the potatoes are bought by him unbagged and bags (whether returnable or not) are supplied by him.

(*c*) Any reasonable costs of transportation (including marine insurance) or cartage borne by him in respect of the potatoes; and

(*d*) Any market charges or port dues paid or payable by him in respect of the potatoes.

10. *Retail Seed Dealer's Maximum Prices.*—The maximum price which may be charged by a retail seed dealer on a sale as or for seed of seed potatoes of the varieties referred to in the Second Schedule shall—

(*a*) In the case of a sale of more than 1 ton of any one variety, be a sum not exceeding the cost to him of the seed potatoes so sold by more than £1 per ton; and

(*b*) In the case of a sale of 1 ton or less, but of more than 1 cwt. of any one variety, be a sum not exceeding the cost to him of the seed potatoes so sold by more than £2 5*s.* per ton; and

(*c*) In the case of a sale of 1 cwt. or less of any one variety, vary according to the cost to him of the seed potatoes so sold and shall be in accordance with the scale set out in the Third Schedule hereto.

11. The cost of seed potatoes to a retail seed dealer for the purpose of the preceding Clause shall be reckoned as including the following items and no more, viz. :—

(*a*) The price actually paid or payable by him for the potatoes; and (*b*) Sums actually paid or payable by him for the carriage of the potatoes except sums paid or payable for the carriage of the potatoes from the place at which in the ordinary course of business seed potatoes would be delivered to him.

12. *Retailer's Charge for Delivery.*—A retail seed dealer, if he is ready and willing to sell at his premises seed potatoes as or for seed at prices not exceeding the maximum prices applicable under this Order, may in addition to the foregoing prices make such charges as may be agreed between him and the purchaser for the delivery of potatoes ordered for delivery to the purchaser not exceeding (whichever shall be the greater) (i) any reasonable charges for such delivery actually paid by the retail seed dealer or (ii) 2*d.* for any quantity not exceeding 1 stone with a further penny for each further half stone or part of half stone so delivered.

13. *Dealers to Keep Records* —Every wholesale seed dealer and every retail seed dealer shall keep an account in which he shall regularly and punctually and at the earliest practicable time enter the particulars of all his purchases of seed potatoes as or for seed showing the variety and class of potatoes purchased, the quantity purchased, the price paid or payable for such potatoes, and all sums (if any) paid or payable for the carriage thereof and he shall in the same account enter the prices at which he has sold the seed potatoes or is offering them for sale, and he shall preserve for not less than six months all invoices, bills, receipts and other documents relating to his purchases of seed potatoes as or for seed, and he shall on lawful demand produce such account and all such invoices, bills, receipts and other documents for inspection and point out which entries in his account and which bills, invoices, receipts and other documents relate to the seed potatoes which he has on sale as or for seed at the time of the demand, or which have been sold by him, and give such other information as to his dealings in seed potatoes as or for seed as the person making such demand shall reasonably require.

14. *Sales in the Ground.*—Where a person sells his potatoes in the ground to a wholesale dealer, the buyer of the potatoes so sold shall be deemed for all the purposes of this Order to be the grower thereof and the terms of this Order shall apply to any seed potatoes dressed out for sale as such save that on every sale of such potatoes by him he shall be deemed to sell as a wholesale dealer and not as a grower.

15. *Application of the First Schedule to the Potatoes Order,* 1917.—(*a*) The provisions of Clause 9 of the Potatoes Order and the First Schedule thereto shall apply to dealings in seed potatoes as or for seed, references to the Potatoes Order, 1917, and the provisions thereof being for the purpose of such application deemed to be references to this Order and the corresponding provisions thereof, and the words "the sum of 15*s.* per ton" being substituted for the words "the sum of 7*s.* 6*d.* per ton" in Clause 8 of such Schedule, and the words "a grower of potatoes" and "for his own planting" being substituted for the words "a public institution or body or otherwise known to be a large consumer" and "for his own consumption" in Clause 10 of such Schedule.

(*b*) Clauses 43 and 47 of the Potatoes Order, 1917, relating to deposits on bags and accommodation sales shall apply to dealings in seed potatoes sold as or for seed.

16. *Modification of the Potatoes Order*, 1917.—Notwithstanding the provisions of the Potatoes Order, 1917:—

(*a*) A grower shall be entitled to dress out seed potatoes so as to separate the same from the rest of his crop and shall keep seed potatoes intended for sale as seed separate from other potatoes, if any, for the time being dealt in by him; and no person need in relation to seed potatoes so dressed out and sold as or for seed comply with the provisions of Clause 7 of the Potatoes Order, 1917, or in a sale of seed potatoes as or for seed comply with the provisions of Clause 44 (*a*) of the Potatoes Order, 1917.

(*b*) No grower, wholesale seed dealer, or retail seed dealer need in relation to seed potatoes sold as or for seed or intended for sale as seed, comply with the provisions of Clauses 45 or 46 of the Potatoes Order, 1917;

(*c*) As from the date of this Order Clause 10 of the Potatoes Order, 1917, shall cease to apply to seed potatoes of the varieties therein mentioned, if sold as or for seed.

17. *Amendments of the Potatoes Order*, 1917.—(*a*) The Potatoes Order, 1917, shall be amended in the manner appearing in the Fourth Schedule to this Order.

(*b*) Copies of the Potatoes Order, 1917, hereafter to be printed by His Majesty's Stationery Office, shall be printed with the additions, omissions and substitutions directed to be made by the Fourth Schedule hereto and such Order shall as from the date when this Order comes into force be construed and take effect as if it had been made with such additions, substitutions and omissions.

18. *Meaning of Lawful Demand.*—Whenever in this Order any person is required to produce any documents or class of documents or give any information on lawful demand, he shall produce or give the same at all reasonable times and places on the demand of any officer or constable of police, or any person authorised by the Food Controller or a Food Control Committee to make such demand either particularly or as holding any office or position, and either generally or in the particular case.

19. *Fictitious Transactions.*—No person shall in connection with the sale or disposal or proposed sale or disposal of any potatoes enter or offer to enter into any fictitious or artificial transaction or make or demand any unreasonable charge.

20. *Contracts.*—Where any contract subsisting at the date of this Order for the sale of any seed potatoes of the varieties mentioned in the Second Schedule provides for the payment of a price in excess of the permitted maximum price, the contract shall, if otherwise lawful, stand so far as concerns any seed potatoes delivered on or before the date of this Order, but shall except in such cases as the Food Controller otherwise determines be avoided so far as concerns any seed potatoes agreed to be sold above the permitted maximum prices which have not been so delivered.

21. *Seed Potatoes (Immune Varieties) Order*, 1917.—(*a*) Clause 4 of the Seed Potatoes (Immune Varieties) Order, 1917, shall be amended by the substitution of the words "1¼ inch" for the words "1 inch."

(*b*) Nothing in this Order shall so long as the Seed Potatoes (Immune Varieties) Order, 1917, remains in force authorise a sale or disposal of any potatoes to which that Order applies.

22. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

SCHEDULE I.

Variety of Potato.	Highest authorised Selling Price per Stone.		
	Class I.	Class II.	Class III.
	s. d.	s. d.	s. d.
Myatt's Ashleaf Kidney	4 0	3 6	3 3
Edzell Blue			
Early Puritan	3 6	3 0	2 6
Duke of York			
Sharpe's Express			
Eclipse			
May Queen			
Midlothian Early			
Sir John Llewelyn			
Ninetyfold	3 0	2 9	2 3
Beauty of Hebron			
Early Rose			
Epicure	2 6	2 3	2 0

SCHEDULE II.

Variety of Potato.	Sums which may be added under Clause 6.		
	Class I.	Class II.	Class III.
	£ s d.	£ s. d.	s. d.
(a)			
King George V.	2 10 0	1 0 0	10 0
Great Scot			
Lochar			
Templar			
(b)			
Royal Kidney	1 0 0	0 5 0	Nil.
British Queen			
Pioneer			
Queen Mary			
(c)			
Evergood	0 15 0	Nil.	Nil.
(d)			
King Edward VII.	0 10 0	Nil.	Nil.
Arran Chief			
Langworthy			
What's Wanted			
Golden Wonder			
Irish Queen			
Shamrock			
Abundance			
President			
Iron Duke			
Scottish Farmer			
(e)			
Any other varieties not specified in either Schedule I. or Schedule II. and not sold under licence ..	0 5 0	Nil.	Nil.

SCHEDULE III.

Scale of Maximum Retail Prices for Seed Potatoes Sold in Lots of 1 Cwt. or Less of any One Variety.

Retailer's Buying Price per cwt. for Potatoes delivered at the place at which he ordinarily takes delivery.	Highest Retail Selling Price for Lots of 1 cwt. or less of any one variety. (Rate per Stone.)	
	s.	*d.*
Up to and including 5*s*. 6*d*.	1	0
Exceeding 5*s*. 6*d*., but not exceeding 6*s*. 0*d*.	1	1
" 6*s*. 0*d*. " " 6*s*. 6*d*.	1	2
" 6*s*. 6*d*. " " 7*s*. 0*d*.	1	3
" 7*s*. 0*d*. " " 7*s*. 6*d*.	1	4
" 7*s*. 6*d*. " " 8*s*. 0*d*.	1	5
" 8*s*. 0*d*. " " 8*s*. 6*d*.	1	6
" 8*s*. 6*d*. " " 9*s*. 0*d*.	1	7
" 9*s*. 0*d*. " " 9*s*. 6*d*.	1	8
" 9*s*. 6*d*. " " 10*s*. 0*d*.	1	9
" 10*s*. 0*d*. " " 10*s*. 6*d*.	1	10
" 10*s*. 6*d*. " " 11*s*. 0*d*.	1	11
" 11*s*. 0*d*. " " 11*s*. 6*d*.	2	0
" 11*s*. 6*d*. " " 12*s*. 0*d*.	2	1
" 12*s*. 0*d*. " " 12*s*. 6*d*.	2	2
" 12*s*. 6*d*. " " 13*s*. 0*d*.	2	3
" 13*s*. 0*d*. " " 13*s*. 6*d*.	2	4
" 13*s*. 6*d*. " " 14*s*. 0*d*.	2	5
" 14*s*. 0*d*.	2	6

For lots of less than one stone, the rate per stone may be charged and the price may be levelled up to the nearest penny.

SCHEDULE IV.

Clause of Potatoes Order, 1917, Amended.	Amendment.
Clause 5	The words " sell seed potatoes or " shall be omitted.
" 8	The words " other than potatoes to which the Seed Potatoes (1917 Crop) Order, 1917, applies," shall be substituted for the words " other than seed potatoes."
Clauses 28 and 32 ..	The words " other than potatoes to which the Seed Potatoes (1917 Crop) Order, 1917, applies," shall be substituted for the words " other than seed potatoes."
Clause 36	The words " potatoes to which the Seed Potatoes (1917 Crop) Order, 1917, applies," shall be substituted for the words " seed potatoes or to potatoes sold as seed."

Potatoes Orders, 1917: General Licence.

AN Order (No. 1170), dated the 8th November, 1917, has been made by the Food Controller, as follows :—

The Food Controller hereby authorises notwithstanding the provisions of Clause 10 of the Potatoes Order, 1917, sales and dealings in Scotland of potatoes grown in Scotland of the variety "Arran Chief" provided that on any such sale or dealing the other provisions of the Potatoes Order, 1917, and the provisions of any other Order of the Food Controller for the time being in force affecting potatoes are complied with.

An Order (No. 1181), dated the 17th November, 1917, has been made by the Food Controller, as follows :—

The Food Controller hereby authorises every grower of potatoes to sell, and offer to sell, his own potatoes at prices lower than the minimum prices fixed by the Potatoes Order, 1917, but otherwise subject to the provisions of such Order.

The Potatoes Order (No. 2), 1917.

AN Order (No. 1188), dated the 19th November, 1917, to be known as the Potatoes Order (No. 2), 1917, has been made, as follows :—

Whereas, with a view to encouraging the growth of potatoes in the year 1917, it was announced on behalf of His Majesty's Government that a minimum price of £6 per ton, free on rail or free on board, would be guaranteed to growers for all sound marketable ware potatoes delivered as required in lots of 4 tons or more. Now, therefore, for the purpose of giving effect to such announcement, and in exercise of the powers conferred upon him by the Defence of the Realm Regulations and of all other powers enabling him in that behalf, the Food Controller hereby orders that except under the authority of the Food Controller the following regulations shall be observed by all persons concerned :—

1. *Interpretation.*—For the purposes of this Order the expression "ware potatoes" means sound marketable potatoes of the 1917 crop (except potatoes sold as or for seed), which will not pass through a riddle having a mesh of 1⅝ in.

The expression "grower," as respects any ware potatoes, means such person as may be determined by or under the authority of the Food Controller to be the grower of such potatoes for the purposes of this Order, and subject to any such determination means the person who was on the 19th November, 1917, the occupier of the land on which such potatoes were grown, or, if such potatoes have been or shall be sold in the ground, the person to whom such potatoes have been or may be so sold.

The expression "the base price" means as respects ware potatoes grown in any area, the rate per ton fixed by the Food Controller from time to time as the base price for that area.

The expression "the selling price" means in the case of a sale of ware potatoes, free on rail, barge, or ship (grower's station, wharf or port) the rate per ton according to the contract and in the case of a sale of potatoes on other terms such rate adjusted in accordance with directions given by the Food Controller to a rate free on rail, barge or ship (grower's station, wharf or port).

For the purpose of ascertaining the time of delivery, potatoes shall be deemed to be delivered when they are first put on rail, barge or ship, or, if put on rail, barge or ship, when they are removed from grower's farm in the course of distribution.

Where potatoes are delivered otherwise than by rail, barge or ship, they shall be deemed to be delivered in a lot of 4 tons or more if the quantity delivered to a single purchaser in any consecutive period of 7 days equals or exceeds 4 tons, and the whole of such lot shall be deemed to be delivered on the last day on which any part of it is so delivered.

2. *Claim by Grower.*—Where the pursuant to a *bonâ fide* contract for sale a grower has in any month or other period prescribed by the Food Controller delivered in lots of 4 tons or more ware potatoes grown by him he may make application to the Food Controller for payment to him in respect of each ton so delivered during that period of a sum equal to the amount by which the average selling price of all ware potatoes so delivered by him during that month falls short of the sum of £6 ; provided that for the purpose of calculating the average selling price, ware potatoes delivered in lots of 4 tons or more and sold at a rate below the base price shall be deemed to have been sold at the base price.

3. *Making and Determination of Claims.*—(*a*) Claims for payment shall be lodged within such time and in such manner and shall be proved by such evidence and shall be made to and determined by such persons and bodies as the Food Controller may from time to time prescribe.

(*b*) The decision of any person or body appointed by the Food Controller to act for the purposes of this Order shall be final and conclusive for all purposes, and payments will be made on the basis of such decision accordingly ; except that any decision made by any such person or body may at any time be reviewed, and, if thought fit, modified or set aside by the Food Controller, notwithstanding that any monies shall have been paid thereunder.

4. *False Statements.*—A person shall not, for the purpose of obtaining a payment under this Order either for himself or any other person make any false statement or false representation.

5. *Exclusion of Certain Persons from Making Claims.*—Except in such cases as the Food Controller may otherwise determine, no claim under this Order shall be allowed if the person on whose behalf such claim is made

(i.) shall, after the 19th November, 1917, have contravened any Order of the Food Controller for the time being in force relating to potatoes, or (ii.) shall have failed to comply with any special or general direction of the Food Controller relating to the disposal or delivery or withholding of delivery of any potatoes of which he is the grower.

6. *Potatoes Delivered Prior to 19th November, 1917.*—This Order shall not apply to ware potatoes delivered before the 19th November, 1917.

7. *Contracts.*—Except in such cases as the Food Controller may otherwise determine, and except in respect of potatoes delivered prior to the 19th November, 1917, all contracts subsisting at the date of this Order for the sale of ware potatoes are cancelled, other than contracts for sale in the ground.

8. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

THE following Notice has been issued by the Food Production Department of the Board :—

Sale of Potatoes for Eating.

The Board of Agriculture and Fisheries have by a general licence under the Seed Potatoes (Immune Varieties) Order, 1917, authorised the sale in England and Wales for consumption of potatocs of the varieties "King Geroge V," "Great Scott," "Lochar," and "Templar," which will not pass through a riddle having a 1⅜-in. mesh. The Food Production Department, however, point out that the provisions of any other Order of the Food Controller affecting such potatoes must be complied with in the case of all sales permitted by this licence, and the licence must not be construed as an authority to deal with any potatoes in contravention of the requirements of any Order relating to Wart Disease. At a later date the Board of Agriculture and Fisheries will be prepared to issue licences for the sale of these varieties for planting ; but, for the present such licences cannot be granted except in very unusual circumstances.

AN ORDER (No. 1173), dated the 17th November, 1917, has been made by the Food Controller to the effect that :—

The Horse and Poultry Mixtures Order, 1917.

1. *Constituents of Horse Mixtures and Poultry Mixtures.*—(*a*) On and after the 22nd November, 1917, no horse mixture or poultry mixture may be made and no mixture may be sold as or for the purpose of a horse mixture or poultry mixture except horse mixtures and poultry mixtures complying with the following conditions :—

(i.) No mixture other than a horse chaff mixture shall contain any substance other than grain, seed, pulse, locust beans and products thereof, and such other substances as the Food Controller may from time to time authorise, except horse chaff mixtures which may contain chaff.

(ii.) All mixtures (except horse chaff mixtures) shall not contain less than three principal ingredients of which all in the case of a horse mixture, and not less than one in the case of poultry mixture, shall have been mechanically treated by bruising, kibbling or splitting.

(iii.) No horse chaff mixture shall contain any substance other than grain, seed, pulse, locust beans and products thereof, and chaff and such other substances as the Food Controller may from time to time authorise.

(iv.) All horse chaff mixtures shall contain not more than two-thirds in weight of chaff and all ingredients other than chaff shall have been mechanically treated by bruising, kibbling or splitting.

(*b*) A mixture which contains any chaff shall, for the purposes of this Order, be deemed to be a horse chaff mixture.

(*c*) This Clause shall not, before the 17th December, 1917, apply to a sale of any horse mixture or poultry mixture which shall be proved to have been mixed before the 22nd November, 1917, in the condition in which it is sold, or offered for sale.

2. *Sales to be by Weight.*—No horse mixture or poultry mixture may be sold otherwise than by weight.

3. *Maker's Maximum Price.*—(*a*) On a sale on and after the 26th November, 1917, of a horse mixture or poultry mixture by or on behalf of a maker, the maximum price (hereinafter called the maker's maximum price) shall not, subject as hereinafter provided, exceed by more than £1 10*s*. per ton the actual cost to the maker of the ingredients used; Provided that where, at the date of this Order, a maker carries on a business as a retailer of the mixtures made by him he may on direct sales to consumers of quantities not exceeding 6 cwt. of poultry mixtures or not exceeding 1 ton of horse mixtures, add to the maker's maximum price the sum permitted according to the table contained in Clause 4 of this Order.

(*b*) The actual cost to the maker of the ingredients used shall be ascertained in accordance with the following provisions :—

(i.) The cost of ingredients bought by the maker shall be the actual cost thereof delivered to his factory.

(ii.) The cost of ingredients grown by the maker shall be deemed to be the current market value thereof delivered to his factory.

(iii.) Where any of the ingredients have been mechanically treated before being delivered to the maker's factory, a sum fairly representing the cost of such treatment, except the cost of re-conditioning, shall be deducted in ascertaining the cost.

(iv.) When chaff is an ingredient, a sum fairly representing the cost of cutting and mixing the chaff shall be deducted in ascertaining the cost.

(*c*) The actual price at which any horse mixture or poultry mixture is sold by the maker (being a price not greater than the maximum price) is hereinafter called the maker's actual price.

4. *Maximum Price on Sales by Person other than the Maker.*—The maximum price on a sale on and after the 26th November, 1917, of horse mixture or poultry mixture by any person other than the maker thereof shall, subject as hereinafter provided, be the actual cost to him of the mixture sold with the addition of a sum at the rate applicable under the following table :—

Mixtures (other than Horse Chaff Mixtures).

Where the sale is of 6 cwt. or more	1*s*. per cwt.
Where the sale is of not less than 3 cwt., and less than 6 cwt.	3*s*. ,,
Where the sale is of not less than ½ cwt., and less than 3 cwt.	4*s*. ,,
Where the sale is of less than ½ cwt.	½*d*. per lb.

Horse Chaff Mixtures.

Where the sale is of 1 ton or more	1*s*. per cwt.
Where the sale is of not less than 5 cwt. and less than 1 ton	2*s*. ,,
Where the sale is of not less than ½ cwt. and less than 5 cwt.	3*s*. ,,
Where the sale is of less than ½ cwt.	1*s*. per stone of 14 lb.

Provided that on a sale by a factor or other dealer of a mixture of which he has not taken delivery into his own premises (hereinafter called a factor's sale) the sum to be added shall not exceed a sum at the rate of 10*s*. per ton.

5. *Actual Cost*.—Subject to the provisions as to transport charges hereinafter contained :—

(*a*) The actual cost of a mixture to a factor or dealer (on a factor's sale) shall be taken to be the price paid or payable by the factor or dealer for the mixture, if less than the maker's maximum price, but otherwise the maker's maximum price.

(*b*) The actual cost of a mixture on a cash sale (other than a factor's sale) by a person other than the maker shall be taken to be whichever shall be the less, namely (i.) the price paid or payable by him for the mixture ; or (ii.) if bought direct from the maker the maker's actual price, or if not so bought the maker's actual price with the addition of such sum, if any, not exceeding a sum at the rate of 10*s*. per ton as may have been lawfully added on a factor's sale.

6. *Transport*.—The maximum prices fixed by this Order are on the basis that all transport charges after sale by the maker are for the account of the ultimate buyer, and accordingly in ascertaining the actual cost of any mixture there may on the occasion of any sale be added to the maximum prices all transport charges after delivery *ex* factory; Provided that the transport charges so added shall be limited to any reasonable amounts actually paid or payable and any other reasonable amounts representing cost of transport not exceeding the customary charges.

7. *Sacks*.—Sacks may be charged for at the usual price, but the amount charged shall be repaid on the return of the sacks in a like good condition.

8. *Invoices*.—The amount charged or added in respect of transport and sacks shall be shown as separate items on the invoice.

9. *Credit*.—The maximum prices fixed by this Order are on the basis of net cash for sales over the counter, and otherwise for cash within 14 days of the date of delivery. Interest may be charged in respect of monies then unpaid at a rate not exceeding 5 per cent. per annum.

10. *Purchaser may rely on Vendor's Statement as to Transport Charges*. —Where the maximum price at which any horse mixture or poultry mixture may be sold by any person depends upon the amount of any sum paid or charged by any former seller, such person shall be entitled to rely upon any written statement as to the amount of such sums that may have been given to him by the person from whom he bought the same unless he has reason to suspect the truth of such statement.

11. *Records*.—Every person making or dealing in any horse mixture or poultry mixture shall keep accurate records containing such particulars as are necessary to show whether or not he is complying with the provisions of this Order so far as they relate to him or his trade, and shall make such returns as may, from time to time, be required by or under the authority of the Food Controller. All such records and documents shall at all times be open to the inspection of any person authorised by the Food Controller.

12. *False Statements.*—A person shall not make any false statement on any invoice or written statement given in connection with any sale or disposition of any horse mixture or poultry mixture.

13. *Fictitious Transactions.*—No person shall, in connection with a sale or disposition, or proposed sale or disposition of any horse mixture or poultry mixture, enter or offer to enter into any artificial or fictitious transaction or make or demand any unreasonable charge.

14. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

AN Order (No. 1174), dated the 17th November, 1917, to come into force on the 17th December, 1917, has been made by the Food Controller to the effect that:—

The Damaged Grain, Seeds and Pulse (Prices) Order, 1917.

1. *Limits of Order.*—This Order shall apply only to imported feed wheat, and to such cereals as have been or may be imported into the British Islands and are or may become damaged and to damaged seeds and damaged pulse, and to such of these cereals, seeds and pulse as may subsequently be mechanically treated.

2. *Maximum Prices.*—(*a*) Subject as hereinafter provided, the maximum price on any sale of any of the articles mentioned in the following table shall be the price applicable thereto according to such table:—

Imported feed wheat	72*s*.	per qr. of	480 lb.
Damaged imported wheat	65*s*.	,,	480 ,,
,, ,, rye			
,, ,, maize			
Damaged imported and damaged home-grown seeds and pulse	65*s*.	,,	480 ,,
Damaged imported barley	55*s*.	,,	448 ,,
,, ,, oats	41*s*.	,,	336 ,,

(*b*) On a sale of any such article which may have been mechanically treated by kilndrying, clipping, splitting, kibbling, bruising, grinding, or any other method, the maximum price shall be the price applicable according to the foregoing table, together with the addition of a sum per qr. not exceeding the customary reasonable charge for such mechanical treatment.

(*c*) On a sale of a mixture containing any of such articles the maximum price for the mixture shall (save in so far as the Food Controller shall have prescribed a maximum price by any Order for the time being in force) be the maximum price of that one of the component parts which under this Order has the lowest maximum price.

3. *Permissible Addition on Purchases from Recognised Dealers.*—On the occasion of a purchase of any of the articles mentioned from any person who is a recognised dealer in such articles, and who is not in the case of a home-grown article the producer thereof, or in the case of an imported article the importer thereof, the maximum price of the article shall be ascertained by adding 2*s*. per qr. to the rate otherwise applicable; provided that where the total quantity of a particular kind of article bought by one buyer from one seller does not in any period of seven consecutive days, including the day of sale, exceed 7½ qr., the maximum price in respect of each qr. so bought shall be ascertained by

adding 4*s*. per qr. to the rate otherwise applicable, and where such quantity does not in that period amount to ½ qr., the maximum price in respect of each qr. shall be ascertained by adding a sum at the rate of 8*s*. per qr. to the rate otherwise applicable. Any amounts which by reason of a later sale in any week have been overpaid or overcharged on an earlier sale in such week shall be allowed as a deduction on the later sale.

4. *Terms of Trading*.—(*a*) The maximum prices applicable under this Order are fixed on the basis of the following terms and conditions being applicable to the transaction :—

(i.) *Imported Articles*.—Sales by importers to be *ex* quay, store or granary, and articles shipped in bags to be sold gross weight, including bags, no charge being made for bags. Other terms of sale (except as hereinafter specifically provided) to be in accordance with the usual custom of the trade. All storage, transport and other charges incurred on the articles after sale by the importer to be for account of the ultimate buyer.

(ii.) *Home-grown Articles*.—Delivery by Producers to be free on rail or barge or to mill or store in accordance with the usual custom of the district. Freight, haulage, porterage or cartage from the point where delivery has been made or is to be made by the producer to be for the account of the ultimate buyer.

All sack hire up to and including the time of delivery to rail, barge, mill or store by producer to be for the producer's account, and all charges for sacks subsequent thereto to be for the account of the ultimate buyer.

(iii.) *All Articles*.—On sales by importers of imported articles, payments to be net cash against bill of lading, warrant or approved delivery order. On all other sales, payment to be net cash within 7 days of completion of delivery, and monies then unpaid thereafter to carry interest not exceeding the rate of 5 per cent. per annum or bank rate, whichever shall be the higher.

(*b*) Where the articles are sold on terms or conditions other than the terms and conditions stated in the foregoing part of this Clause, a corresponding adjustment shall be made in the maximum price, and for this purpose the cost of delivery of home-grown articles for which the producer is liable under the above terms, shall be reckoned at the rate of 6*d*. per ton per mile.

5. *Invoice*.—The amount added to the maximum price in respect of charges permitted under Clause 4 of this Order shall be accurately shown as separate items on the invoice relating to the sale and shall not, in any case, exceed reasonable expenses actually paid or incurred.

6. *Statement by Vendors*.—Where the maximum price at which an article to which this Order applies may be sold by any person depends upon the amount of any sums paid or charged for transport or storage, or any other matter by any former seller such person shall be entitled to rely upon any written statement as to the amount of such sums which may have been given to him by the person from whom he bought the article in question unless he has reason to suspect the truth of such statement.

7. *Offers and Conditions*.—No person shall sell or buy, or offer to sell or buy any article to which this Order refers at a price exceeding the maximum price applicable under this Order, or in connection with

a sale or disposition of any such article, enter or offer to enter into a fictitious ar artificial transaction, or make or demand any unreasonable charge.

8. *Records.*—Any person dealing in any article to which this Order applies shall keep accurate records containing such particulars as are necessary to show whether or not he is complying with the provisions of this Order so far as they relate to him or to his trade, and shall make such returns as shall, from time to time, be required by or under the authority of the Food Controller. All such records and documents shall at all times be open to the inspection of any person authorised by the Food Controller.

9. *Definition of Quarter.*—In the case of barley, "quarter" shall mean 448 lb. weight, and in the case of oats, shall mean 336 lb. weight, and in the case of all other articles, shall mean 480 lb. weight.

10. *Interpretation.*—In this Order the following expressions shall have the following meanings :—

"Seeds" shall mean dari-seed, millet-seed, and other seeds (excepting seeds commonly known as oil seeds) which are suitable for, and ordinarily used for, the purpose of feeding poultry or other animals.

"Damaged oats" shall mean oats so damaged as to be unsuitable for feeding purposes without being re-conditioned by kiln-drying or other mechanical treatment.

"Damaged" shall mean in relation to all articles to which this Order applies (other than oats), such articles as are in the ordinary course of trade classed as damaged.

"Feed wheat" shall mean wheat officially graded as feed wheat before importation into the British Islands.

"Importer" shall mean the person sighting the shipper's drafts, but this shall not be construed so as to limit the general interpretation of that expression.

"Recognised dealer" shall mean a person who in the ordinary way of his business deals in grain for the purpose of his livelihood.

11. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

AN Order (No. 1182), dated the 17th November, 1917, has been made by the Food Controller to the effect that :—

The Dredge Corn Order, 1917.

1. *Use of Dredge Corn and Flour obtained therefrom.*—No person shall, on or after the 21st November, 1917, use any dredge corn, other than damaged dredge corn, except in the process of manufacturing flour, or use any flour obtained from any such dredge corn except for the purpose of human food.

2. *Maximum Prices for Dredge Corn.*—No person shall, on or after the 17th December, 1917, sell or buy or offer to sell or buy any dredge corn at a price exceeding the maximum price applicable according to the following provisions :—

(*a*) The maximum price as respects damaged dredge corn shall, where the corn does not consist partly of oats, be the maximum price applicable under the Grain (Prices) Order, 1917, on the occasion of a like sale of damaged barley, and when the corn does consist partly of oats, the maximum price applicable under such Order on the occasion of a like sale of oats improperly cleaned.

(*b*) The maximum price as respects dredge corn (other than damaged dredge corn) shall, where the corn does not consist partly of oats, be the maximum price applicable under the said Order on the occasion of a like sale of barley, and when the corn does consist partly of oats, the maximum price applicable on the occasion of a like sale of oats.

3. *Fictitious Transactions.*—No person shall, in connection with the sale or disposal or proposed sale or disposal of any dredge corn, enter or offer to enter into any fictitious or artificial transaction, or make or demand any unreasonable charge.

4. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

5. *Interpretation.*—For the purposes of this Order, "dredge corn" shall mean a mixture of cereals, whether or not grown together, containing more than one cereal as a main constituent.

"Damaged dredge corn" shall mean corn which has been so damaged that the flour or meal which could be milled therefrom would not be fit for use in human food.

AN Order (No. 1186), dated the 19th November, 1917, has been made by the Food Controller to the effect that:—

The Food Control Committee (Milk Requisition) Order, 1917.

1. *Power to Requisition Milk.*—(*a*) Where a Food Committee are of opinion that there is an insufficient supply of milk available for consumption within their area and that such insufficiency arises from a diversion or withholding of supplies formerly retailed within their area, the Committee shall have power to require or direct any producer of milk who, in the opinion of the Committee, is diverting or withholding any milk, to hold at the disposal of the Committee such quantities of milk produced by him as the Committee may, from time to time, determine, and to deliver the same to the Committee, or such persons as they may name, in the customary vessels and otherwise in such manner as the Committee may from time to time determine.

(*b*) Every person to whom any direction is given under the power conferred by this Clause shall duly comply with such direction, and no person shall be relieved from the necessity of complying with any such direction by reason of any contracts or arrangements made by him as to the disposal of his milk.

(*c*) A Food Committee shall exercise the powers hereby conferred upon them only with the previous consent of the Food Controller, and subject to such conditions as the Food Controller may from time to time prescribe.

(*d*) A Food Committee may dispose of milk acquired by them pursuant to this Order in such manner as they shall think fit.

2. *Price.*—A Food Committee shall agree to pay in respect of milk requisitioned under this Order the maximum price payable to a producer under Clause 3 of the Milk (Prices) Order, 1917, on a wholesale sale.

3. *Arbitrator.*—Any arbitrator to act for the purposes of this Order shall be appointed by the Lord Chief Justice of England.

4. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

5. *Meaning of "Food Committee."*—For the purposes of this Order "Food Committee" means a Food Control Committee constituted in pursuance of the Food Control Committee (Constitution) Order, 1917.

This Order became operative as from the 21st November, 1917, and extends only to Great Britain.

THE following Order (No. 1192), dated the 20th November, 1917, has been made by the Food Controller :—

The Cream Order, 1917.

In exercise of the powers conferred upon him by the Defence of the Realm Regulations, and of all other powers enabling him in that behalf, the Food Controller hereby orders that, except under the authority of the Food Controller, the following regulations shall be observed by all persons concerned :—

1. *Use and Sale of Cream.*—No person shall, after the 8th December, 1917, use any cream, except for the purpose of making butter or for such other purposes as the Food Controller may from time to time authorise; and no person shall, after the 8th December, 1917, sell, supply or acquire or offer to sell or supply or attempt to acquire any cream except for such purposes.

2. *Exceptions from Order.*—Clause 1 of this Order shall not affect :—

(*a*) Before the 15th January, 1918, the use, sale, supply or acquisition of preserved or sterilised cream made before the 20th November, 1917.

(*b*) The consumption of fresh cream by children under the age of 5 years, patients in hospitals and other similar institutions, and invalids or other persons needing cream in the interests of their health, or the sale, supply or acquisition of cream for the purpose of such consumption, or with a view to its sale or supply for such consumption: Provided that where cream is sold, supplied or acquired for the purpose of such consumption it shall not be sold, supplied or acquired otherwise than in accordance with such a statement as is hereinafter mentioned.

3. *Statement.*—(i.) Where cream is sold or supplied for the purpose of such consumption as is permitted under Clause 2 (*b*) of this Order, the person selling or supplying the same shall require to be furnished with a statement in writing signed by his customer stating :—

(*a*) *In cases where the cream is to be supplied for consumption by* a child, the name, age, and address of the child, the maximum amount to be supplied, and the person to whom it is supplied.

(b) In cases where the cream is to be supplied for consumption by patients in hospitals or other similar institutions, the name and address of the hospital or other institution, and the maximum amount to be supplied.

(*c*) In cases where cream is to be supplied for consumption by an invalid or other person needing cream in the interests of his health, the name and address of the invalid or such other person, the maximum amount to be supplied, the period of supply, and the name and address of a duly qualified medical practitioner who has authorised such supply, and the date of such authority.

(ii.) All such statements shall be preserved by the person supplying any cream thereunder, and shall be produced and dealt with by him as directed by any person authorised in that behalf by the Food Controller or a Food Committee.

4. *Disclosure to be Required and Given.*—All parties to any transaction affecting cream shall require or correctly disclose (as the case may be) all such information as may be necessary or required by such parties as aforesaid or by or under the authority of the Food Controller or any Food Committee for the purpose of satisfying them or him that the provisions of this Order have not been or are not being contravened.

5. *False Statements.*—A person shall not knowingly make or connive at the making of any false statement for the purpose of obtaining a supply of cream.

6. *Interpretation.*—The expression "Food Committee" shall mean in respect of any area in Great Britain the Food Control Committee established for such area pursuant to the Food Control Committeee (Constitution) Order, 1917, and in respect of Ireland the Food Control Committee appointed for Ireland by the Food Controller.

7. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

8. *Title and Duration of Order.*—(*a*) This Order may be cited as the Cream Order, 1917.

(*b*) This Order shall cease to be in force on the 30th April, 1918, but without prejudice to any proceedings in respect of any previous contravention thereof.

AN Order (No. 1193), dated the 20th November, 1917, has been made by the Food Controller as follows:—

The Pigs (Maximum Prices) Order, 1917.

The Food Controller hereby authorises (1) all live-stock auctioneers on the occasion of any sale of live pigs by them to ascertain the weight of such pigs for the purposes of the above Order; and (2) the market authority on the occasion of any sale of live pigs in their market to ascertain the weight of such pigs for the same purpose.

AN Order (No. 1156), dated the 12th November, 1917, has been made by the Food Controller to the effect that:—

The Testing of Seeds Order, 1917.

1. *Regulation of Sale and Exposure for Sale of Seeds.*—On and after the 1st January, 1918, no seedsman, grower or farmer, except as hereinafter provided, shall sell or expose for sale for sowing any seeds as defined in this Order, unless,

(*a*) A sample of the seeds has previously been taken and tested in accordance with the provisions of this Order, either by or on behalf of the seller or at one of the following Government stations:—For England and Wales at the Seed Testing Station, Board of Agriculture and Fisheries, Food Production Department, 72, Victoria Street, London, S.W. 1.; for Scotland, at the Seed Testing Station, Board of Agriculture for Scotland, 29, St. Andrew Square, Edinburgh; for Ireland, at the Seed Testing Station of the Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin;

(*b*) In the case of a sale the particulars required by this Order are correctly declared to the purchaser at or before the time of sale or delivery in writing, either in an invoice of the seeds or in some other form: provided that it shall be sufficient for the purposes of this provision if the declaration is made by reference to a printed catalogue or to a price list containing the particulars required by this Order; and provided also that in the case of a sale and delivery prior to the 1st July, 1918, the declaration need not be given unless demanded by the purchaser in regard to any quantity of the following seeds: pea, bean, garden turnip, parsnip, onion, carrot, beet, garden cabbage, garden kale; and in the case of any sale or delivery need not be given in respect of sales not exceeding 2 lb. of pea and bean and not exceeding 8 oz. of garden turnip, parsnip, onion, carrot, beet, garden cabbage, garden kale; and

(*c*) In the case of seeds exposed for sale (other than those enumerated in 1 (*b*) a copy of the declaration required by this Order is conspicuously exposed on or in connection with the seeds.

2. *Particulars Required to be Declared*—(1) The particulars required by Clause 1 of this Order are:—

(*a*) The name and address of the seller;

(*b*) The kind of seeds sold or exposed for sale and, in the case of cereals, clovers and sainfoin, the variety of seeds;

(*c*) In the case of sainfoin, lucerne, clovers, cocksfoot, timothy and meadow fescue seed, the country of origin (England, Wales, Scotland and Ireland being for this purpose treated as different countries), or if the country of origin is not known to the seller a statement to that effect.

(*d*) In the case of mixtures of grasses or of clovers or of grasses and clovers, which may be sold or exposed for sale for agricultural purposes, the particulars required by paragrpahs (*b*) and (*c*) shall be given in respect of each kind of grass or clover seed in the mixture and the proportion by weight of each kind shall also be given.

(2) In the case of a sale or exposure for sale of seeds other than cereals the required declaration shall include the following additional particulars:—

(*a*) The percentage by weight of pure seed subject to the scale of latitude in the Second Schedule of this Order;

(*b*) In the case of clovers, lucerne, and timothy, whether dodder is present;

(*c*) The total percentage by weight of injurious weed seeds present where such total exceeds 1 per cent. For the purposes of this Order none but dock (*Rumex conglomeratus*, Murr., *R. obtusifolius*, L., *R. crispus*, L.), sheep's sorrel (*R. Acetosella*, L.), wild carrot (*Daucus carota*, L.), Yorkshire fog (*Holcus lanatus*, L.), soft brome grass (*Bromus mollis*, L. *et. spp.*), suckling clovers

(*Trifolium dubium*, Sibth., *T. procumbens*, L., and also *T. parviflorum*, Ehrh., and *T. angulatum*, Waldst.), is regarded as an injurious weed seed :

(*d*) In the case of sainfoin, where more than 5 per cent. by weight of Burnet (*Poterium sanguisorba*, L.) is present in the sample, the percentage must be stated ;

(*e*) The percentage of seeds by number of the kind of which the sample purports to consist capable of germination, as ascertained by a germination test ;

(*f*) In the case of sainfoin, lucerne, trefoil and clovers the percentage by number of hard seeds ; and

(*g*) The month and year in which the germination test was made.

3. *Scale of Latitude as regards Total Impurities and Capabilities of Germination.*—The particulars of the percentage of pure seed or of the percentage of seeds capable of germination shall not for the purposes of these provisions be deemed to be incorrectly stated if they do not differ from the actual percentage as determined by a Government station as defined in Clause 1 (*a*) by more than the percentages permitted by the scale of latitude in the Second Schedule hereto.

4. *Powers of Entry and Sampling.*—Any person authorised for England and Wales by the Board of Agriculture and Fisheries, for Scotland by the Board of Agriculture for Scotland, and for Ireland by the Department of Agriculture and Technical Instruction for Ireland, may take, without payment, samples of any seeds which have been sold or are being exposed for sale and may enter on any premises for the purpose of taking such samples. In any case of dispute as to the correctness of any particulars given by a seller where such particulars are required by this Order, the result of a test carried out by the Government Station of that part of the United Kingdom in which the purchaser resides shall be regarded as conclusive evidence, but the seller shall, on demand, be provided by the Government Station with a sealed portion of the sample which has been tested.

5. *Certificate of Test.*—In any proceedings in respect of an infringement of this Order the production of the certificate as to the result of a test carried out in England and Wales given by the Board of Agriculture and Fisheries, as to the result of a test carried out in Scotland given by the Board of Agriculture for Scotland, or as to the result of a test carried out in Ireland, given by the Department of Agriculture and Technical Instruction for Ireland, shall be sufficient evidence of the facts therein stated, unless the defendant requires that the person who made the test shall be called as a witness.

6. *Exception of Certain Sales.*—This Order shall not apply to—

(*a*) A sale by wholesale of seeds invoiced as "seeds as grown," or any exposure by the wholesaler for sale of seeds for the purpose of such a sale ; but nothing in this exception shall affect the liability of the producer or agent for failure to deliver seed of the variety named at the time of sale ;

(*b*) A sale for delivery outside the United Kingdom ;

(*c*) A sale by retail in Ireland of seeds for sowing purchased by the vendor previous to August 1st, 1917, provided that in lieu of the declaration required by this Order the words "previous seasons' seed" shall appear on the invoice or be conspicuously displayed on or near such seeds when exposed for sale.

7. *Definitions.*—For the purpose of this Order "a sample" means a sample taken in the following manner :—

(*a*) In the case of seeds sold retail, and in the case of seeds sold wholesale in quantities of 1 sack (4 bush.) or under, portions shall be drawn from the top, middle and bottom of the bag in which the seeds are contained. All the portions so taken shall be well mixed and a representative sample of the whole be used.

(*b*) In the case of seeds sold wholesale in quantities of over 1 sack (4 bush.) or bag portions shall be drawn from each sack or bag by means of a sampling instrument, these portions shall be thoroughly mixed and a representative sample of the whole shall be taken : provided that when the amount sold consists of over 5 sacks or bags and not more than 10 sacks or bags, portions need only be taken from one sack or bag in three ; and that if the amount sold is over 10 sacks or bags and not more than 50 sacks or bags, portions need only be taken from one sack or bag in five ; and that if the amount sold exceeds 50 sacks or bags portions need only be taken from one sack or bag in ten. In the case of seeds stored in heaps or bins the sample shall be a sample from representative portions taken from various parts of the heap or bin so as fairly to represent the bulk.

The sizes of samples for testing shall be as follows :—

Timothy, white clover and alsike clover, not less than	1 oz.
Red clover, crimson clover, trefoil, lucerne, rye-grasses, cocksfoot, meadow fescue, crested dogstail, rape, turnip, swede, cabbage, carrot, parsnip, onion, mangold, beet and kale, not less than ..	2 ,,
Sainfoin, not less than	3 ,,
Pea, bean, tares or vetches, wheat, oat, barley and rye, not less than	4 ,,

Where a sample has been taken in the presence of and sealed or marked by the seller and the person obtaining the sample or his representative, the sample shall be deemed to have been duly taken.

"Impurities" mean all seeds or portions of seeds other than those of which the parcel purports to consist, whether they are those of weeds, harmless plants, or other cultivated plants, and also broken seeds of the kind of which the parcel purports to consist, so far as they are incapable of germinating, and also foreign matter, sand, grit, soil, fragments of roots, stems or flowers, single glumes, single flowering glumes and single pales, smut, ergot, and other sclerotia. In the case of rye-grass, meadow fescue and cocksfoot, the seed shall be considered to be "pure" if it consists at least of two united pales, regardless of the state of development or even the entire absence of the caryopsis or kernel within the pales.

8. *Application to Sales before 1st January,* 1918.—This Order shall apply to a sale made before the 1st January, 1918, as regards any seeds delivered to the purchaser on or after that date.

9. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

FIRST SCHEDULE.

Kind of Seeds of which the Sale and Exposure for Sale is regulated.

Wheat, barley, oats and rye.
Perennial rye-grass.
Italian rye-grass.
Meadow fescue.
Timothy
Red clover.
Alsike.
White clover.
Crimson clover.
Trefoil.
Lucerne.
(Red clover to Lucerne: Under whatever trade names sold.)
Sainfoin.
Crested dogstail.
Tares or vetches.
Pea.
Bean.
Mangold.
Swede.
Rape.
Parsnip.
Onion.
Carrot.
Beet.
Turnip (field).
„ (garden).
Cabbage (field).
„ (garden).
Kale (field).
„ (garden).

SECOND SCHEDULE.

SCALE OF LATITUDE.

Germination.

Where the percentages of germination stated in the prescribed particulars are :—

				Allow per cent.
Between	100 — 95	and	1 — 5	± 4
„	94 — 90	„	6 — 10	± 6
„	89 — 85	„	11 — 15	± 7
„	84 — 75	„	16 — 25	± 8
„	74 — 55	„	26 — 45	± 9
„	54 — 49	„	46 — 50	± 10

Purity, after Eliminating Impurities.

Where the percentages of total pure seed stated in the prescribed particulars are :—

		Allow per cent.
Between	100 — 97	± 1
„	96 — 90	± 2
Below	90	± 4

Where the percentage is stated by the seller with a range, *e.g.*, 94–90 per cent., the percentage for the purposes of the Scale of Latitude shall be the mean, *i.e.*, in the above case 92 per cent.

Injuries to Weed Seeds.

No scale of latitude shall be allowed in respect of the percentage of injurious weed seeds.

THE following Circular has been issued by the Food Production Department of the Board of Agriculture and Fisheries :—

The Testing of Seeds. The Seed Testing Station of the Food Production Department is now fully equipped, and members of the trade may, if they desire, avail themselves of the Station for having their seeds tested.

Firms who send their seeds to the Station must comply with the following regulations :—

(1) *Kinds of Seeds that will be Tested*—

Wheat, barley, oats and rye.
Perennial and Italian rye-grasses.
Cocksfoot, meadow fescue, timothy and crested dog's-tail.
Red, alsike, crimson and white clovers.
Trefoil, lucerne and sainfoin.
Tares or vetches.
Peas, beans, mangolds, swedes, turnips, cabbage, kale and rape.
Parsnip, onion, carrot and beet.

Seeds of species other than the above cannot at present be tested at the Station.

(2) *Method of Sample Taking and Size of Sample*—

Traders are advised in their own interests to take every precaution to secure a fair sample. The procedure to be adopted should be as follows :—

In the case of seeds stored in quantities of 1 sack or under, portions should be drawn from the top, middle and bottom of the bag in which the seeds are contained. All the portions so taken should be well mixed, and a representative sample of the whole must be taken and sent to the Station for a test. In the case of seeds in quantities over 1 sack, portions should be drawn from each sack by means of a sampling instrument, these portions should be thoroughly mixed and a representative sample of the whole must be sent, provided that, when the consignment consists of over 5 sacks and not more than 10 sacks, portions need only be taken from 1 sack in 3 ; that if the consignment is over 10 sacks and not more than 50 sacks, portions need only be taken from 1 sack in 5 ; and that if the consignment exceeds 50 sacks, portions need only be taken from 1 sack in 10. In the case of seeds stored in heaps or in bins the sample should be a sample from representative portions taken from various parts of the heap or bin so as fairly to represent the bulk.

The weight of the sample of the seed sent for testing should be not less than :—

For timothy, white and alsike clovers	1 oz.
,, rye-grasses, cocksfoot, meadow fescue, crested dog's-tail	2 ,,
,, red and crimson clovers, trefoil and lucerne ..	2 ,,
,, rape, turnip, swede, cabbage, carrot, parsnip, onion, mangold and beet	2 ,,
,, sainfoin	3 ,,
,, peas, beans, vetches, wheat, oats, barley and rye	4 ,,
,, all clovers and lucerne for examination for dodder	4 ,,

(3) *Despatch of Samples*—

Each kind of seed must be enclosed in a separate strong envelope and forwarded either separately or in a well-made-up parcel addressed to :—

THE DIRECTOR-GENERAL,
Food Production Department,
72, Victoria Street,
London, S.W. 1.

and marked in the top left-hand corner "*Seed Testing Station.*"

A slip of paper must be enclosed in the envelope with each sample giving the following particulars :—

1. Full name and postal address (including county) of sender.
2. Date when sent.
3. Kind and variety of the seed.
4. Sender's reference number or mark if several samples of any one variety of seed are sent.

It would be of great service to the Station if firms sending samples would also give the following information :—

1. The country of origin of the sample.
2. Any other information in respect of the sample likely to be of scientific interest.

If sent by letter post and properly addressed in accordance with the above instructions the postage on the samples need not be paid, but if sent by parcels post it must be paid.

(4) *Reports on Samples and Fees*—

(a) *Samples representing bulks for use in the United Kingdom.*

A report on samples submitted will be furnished to traders on payment of the following fees :—

A—Full report, including percentage germination, percentage purity, percentage of injurious weed seeds, percentage of hard seed in the case of clovers, and a statement of the chief impurities present. 2*s*. 6*d*. per sample.

B—Report on the percentage purity, percentage of injurious weed seeds present, and statement of the chief impurities. 1*s*. 6*d*. per sample.

C—Report on the presence or otherwise of clover dodders in clovers, and a statement as to the species of impurities present (without any percentages). 1*s*. per sample.

D—Interim reports (which can be supplied only to those firms who open a deposit account with the Department) on sample sent for a full report, giving the information set out in B above, will be furnished for an additional fee of 6*d*. per sample.

The fees must accompany the samples and should be made payable by cheque or postal order to " The Food Production Department " and crossed " Bank of England."

Traders desiring to do so may open a deposit account with the Department.

Samples will be dealt with at the Station in strict rotation as received.

It should be noted, however, that the testing of samples requires time, and seedsmen are therefore urged to send in their samples at the earliest possible moment.

The full reports on samples will usually be furnished in about two weeks, except in the case of the following seeds : crested dog's-tail, cocksfoot, mangold, onion, carrot and parsnip, which may require from three to four weeks.

Reports giving the particulars as set out in C above will usually be sent within 48 hours of the arrival of the samples at the Station ; and reports on percentage purity only (B above) will, as far as possible, be sent within four days of the receipt of the samples. Interim reports in respect of samples sent to the Station for a full report, giving the particulars as to purity (B above) when special request is made for same, will also as far as possible be forwarded within four days. Interim reports cannot, however, be guaranteed, and will in any event only be furnished to firms opening a deposit account with the Department.

The full report issued by the Station will include a statement as to the germination of the sample; the amount of impurity it contains; and a separate indication of the percentage of injurious weeds present. The chief weed seeds included in the sample will be named.

In the case of clovers the percentage of "hard seeds" will be given. The presence or otherwise of the seeds of dodder will also be noted.

Additional "*remarks*" will be made as to the condition of the sample if it seems desirable in the interests of the sender to do so. For instance, if there is evidence to suggest that "English" or "Welsh" red clover contains an admixture of foreign red clover seed, this will be stated. Again, if samples of "wild white clover" show any indications of not being genuine, the reasons for the conclusion reached will be given. The report will not include a pronouncement as to whether the seed is true to name in respect to variety.

Methods of Testing.—It must be understood that the method of testing the rye-grasses, cocksfoot and meadow fescue in respect of all samples representing bulks for use in the United Kingdom is that laid down in the Testing of Seeds Order, 1917; that is to say, "the seed shall be considered to be *pure* if it consists of at least the two united pales, regardless of the state of development or even the entire absence of the caryopsis or kernel within the pales"; in other words, "light seed" will not be regarded as an impurity.

The detailed methods adopted by the Station for conducting the germination and purity tests on all the species scheduled in the Testing of Seeds Order will be sent, on application, to firms who conduct their own seed analyses.

(b) *Samples from bulks of which a part, or the whole, may be exported.*

The method of testing adopted at the Station is somewhat different from that employed at Continental stations in respect of the rye-grasses, cocksfoot and meadow fescue; samples of these grasses, therefore, will, if desired by traders conducting an export business, also be tested by the Continental or universal method. It must be understood, however, that the reports issued on the results of these tests are not valid for the purpose of making declarations in respect of sales in the United Kingdom; and that they can only be used in reference to the export of the bulks to which they refer.

Every endeavour will be made to expedite the issue of reports on samples of the grasses above mentioned sent to the Station to be tested by the Continental method for export purposes. During the busy season, however, when the testing of samples for use in the United Kingdom is of first importance, it may be found impossible to test these export samples in strict rotation as received. In order to avoid delay or disappointment, traders requiring these special tests should ascertain if the Station is in a position to deal with them in a specified time before actually sending their samples to be tested.

Full reports only will be issued in respect of these special tests, and the fee payable will be 2*s.* 6*d.* per sample.

In respect of the other grasses, and all the clovers and other plants upon which the Station is prepared to issue reports, there is no material difference between the methods of testing employed at the Station and those on the Continent. Some of the Continental stations, however, as well as, or instead of, stating the percentage of "hard seed" as such in the samples of clovers and their allies, make an allowance for same in the percentage of germination. No allowance will be made in respect of "hard seed" in the germination as reported by the Station.

(5) *Use which may be made of the Reports sent out by the Station*—

The reports issued by the Station may be used for the purpose of making a declaration in respect of the bulks from which the samples have been drawn. Retail firms, may, of course, sell their seeds on the declarations upon which they purchase from the wholesale houses; but in their own interests they would be well advised to have check tests made.

It will be necessary, moreover, for retailers to have tests made on their stocks held over from a previous year, and upon bulks made up for sale by blending or mixing, in order that they may make the necessary declarations.

It must be distinctly understood that vendors are entitled to refer to the fact of their seeds having been tested at the Department's Station, only in respect of bulks from which samples have been drawn and reports actually issued. Announcements in general terms must not be made in handbooks, catalogues or other publications in respect of the use made of the Department's Station by firms availing themselves of the facilities given.

(6) *Government Seed-Testing Stations in the United Kingdom*—

The Station now set up by the Board of Agriculture and Fisheries at the Food Production Department is complementary to the stations already established by the Board of Agriculture for Scotland at 29, St. Andrew Square, Edinburgh, and by the Department of Agriculture and Technical Instruction for Ireland at Upper Merrion Street, Dublin. The Station in London, therefore, can only deal with samples for traders whose registered offices are in England and Wales. In the interests of traders and farmers alike it is most important that samples from the same bulks should not be sent to more than one of the Government Stations to be tested; the staff at each Station will be taxed to the utmost during the busy season, and it is consequently very necessary to avoid duplication of tests.

The Testing of Seeds Order, 1917—

Traders are reminded: (1) that the Testing of Seeds Order, 1917, of the Food Controller applies to samples offered for sale in England, Wales, Scotland and Ireland; (2) that it is not essential that the tests necessary for the purposes of the Order shall be made at a Government Station.

Copies of the Order may be obtained from any bookseller, or from H.M. Stationery Office, Imperial House, Kingsway, (price 1½*d*.).

THE following Notice has been issued by the Food Production Department of the Board :—

Preserved Fruit and Vegetables: The Necessity for Inspection.

It is very important that everybody who has bottled fruit should inspect the bottles from time to time. If it has not already been done, the screw-top of each bottle should be unscrewed in order to make sure that the vacuum produced after heating the fruit was sufficient to hold the glass cover firmly in place. Unless the glass cover remains firmly in position after the screw-top is removed the preserved fruit will not keep.

The jars of which the glass covers are loose should, if the contents are still sweet, be sterilised again.

The most important things in connection with the bottling of fruit and vegetables are :—

(1) a good rubber ring, and

(2) a firmly-attached glass cover.

If the glass cover is loose, it is a sure sign that the work of bottling has not been properly done. It follows, therefore, that everyone who has a stock of preserved fruit should go over it at the earliest opportunity, remove the screw tops and make sure that the glass covers are tight.

THE following Memorandum, dated 23rd November, 1917, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Hiring of Implements.

In the Memorandum F.P. 92 the charges include that of 1*s*. a day for the use of implements used with horses under the gang system. It is not proposed to alter this charge in any way, but it has been pointed out to the Department that a flat-rate of 1*s*. a day for all implements hired by the Agricultural Executive Committees to farmers is not a sound one. Agricultural Executive Committees are therefore empowered to make such charges as they consider reasonable for implements hired to farmers. These charges to be based on the customary local rates or on the value of the implement hired.

This Memorandum cancels all previous instructions on this subject.

THE following Memorandum, dated the 23rd November, 1917, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Drainage of Land.

1. By the Drainage of Lands Order, 1917 (Statutory Rules and Orders, 1917, No. 294), which was communicated to Agricultural Executive Committees with the Circular F.P. 25, dated 7th April, 1917, the powers conferred upon the Board by paragraphs 1 (*h*) and (*i*) of Regulation 2M were delegated to Agricultural Executive Committees, subject in the case of paragraph (*i*) to an appeal to the Board.

Paragraph (*h*), which deals with the cleansing of channels and maintenance of banks is unaltered; but an amendment of paragraph (*i*) has now been made by Order in Council dated 16th November, 1917. The powers given by this paragraph have now been extended so as to enable notices to be given not only to regulate the outflow of water through dams, sluices, and other structures, but also the inflow of water through cloughs, tidal doors and so on.

The appeal to the Board is preserved as before.

Paragraph (*i*) is now as follows :—

> (*i*) By notice served on the occupier or person in control of any dam, mill, lock, sluice, weir, or other structure affecting the flow of water in any river or stream, to require such occupier or person to keep open or closed any mechanical appliance by which the inflow or outflow of water is capable of being regulated during such times and in such manner as the Board, having regard to the use by such occupier or person of the structure and of the water thereby impounded, consider to be necessary or desirable for the prevention of floods or for the draining of land adjoining or near the river or stream.

The second form of notice appended to Circular F.P. 25 will require a slight adaptation in any case in which appliances are ordered to be kept closed, instead of being opened.

2. The Board have also received powers under Paragraph 1 (*k*), (*l*) and (*m*) of Regulation 2M to take possession of any dam, mill, lock, sluice, weir or other structure affecting the flow of water in any river or stream, and remove the same, or effect any alterations and repairs necessary for its use, where such action is necessary for the prevention of floods or the drainage of agricultural land. Powers are also given to enter upon any river or stream or any land adjoining it in order to remove obstructions or improve the flow of water. Somewhat similar action may be taken with regard to sea defence works and drainage outfalls. The expenses of works done under these new powers may be recovered from any person to whose default in carrying out his statutory or other obligations they are directly attributable

3. Owing to the complicated interests that may be involved, and to other considerations, it has been found impracticable to delegate generally to Agricultural Executive Committees the powers now conferred by paragraphs (*k*), (*l*) and (*m*), and these are retained in the hands of the Board. In any specific cases, however, in which it is decided to exercise any of these powers, the Board will ask the Agricultural Executive Committee to act as their agents in the matter. Where any appropriate case comes to the notice of an Agricultural Executive Committee they are requested to report the facts to this Department.

4. No alteration has been made in paragraph 1 (*j*) of Regulation 2M, and consequently the Drainage of Lands Order, 1917 (No. 2), and the instructions contained in the Circular F.P. 52, remain as before.

Parasitic Mange in Horses Loaned to Farmers.

THE following Circular Letter, dated the 23rd November, 1917, has been addressed to County Agricultural Executive Committees by the Food Production Department of the Board :—

SIR,—The attention of the Food Production Department has been called to the fact that parasitic mange has been found to exist amongst horses purchased by the Department for ploughing.

Such horses, being the property of the Crown, are exempted from the provisions of the Parasitic Mange Order of 1911, by Article 10 of that Order, but, in order that prompt and efficient measures may be taken, it has been decided that such horses shall in future be regarded as if they were subject to the provisions of the Order, a copy of which is enclosed herewith* for the information of the Executive Officers of your Committee.

It should accordingly be an instruction to the farmer contracting for the loan of horses and a ploughman, under the Department's Scheme, that, in the event of parasitic mange being found, or suspected, on any horse so loaned to him he shall notify that fact forthwith to the Horse Officer of the County Agricultural Executive Committee.

The Horse Officer on receipt of such notice should inform the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. 1.

At the same time he should arrange that a veterinary surgeon shall examine the horse, and, in the event of his diagnosis confirming the existence of "parasitic mange," as defined in Article I. of the Order, steps are to be taken forthwith to secure that the provisions of the Order as regards detention and treatment of affected or other animals exposed to infection, and as to cleansing and disinfection, are carried out.

I am, etc.,
H. L. FRENCH, *General Secretary.*

THE following Memorandum has been addressed by the Food Production Department of the Board to Agricultural Executive Committees in England and Wales:—

Credit to Farmers.

1. *Method of Procedure.*—Experience of the working of the Credit Scheme points to the desirability of introducing certain modifications in the procedure for dealing with applications as indicated in the Department's Memoranda, dated 16th March, 7th April, and 9th August, 1917.

Under the existing arrangement, approval of an application is notified to the applicant on Form F.P. 15, and to the Bank on F.P. 16. The applicant is supposed to forward the letter of approval to the dealer as evidence (in the absence of prepayment) that the account will be settled promptly. This arrangement is not altogether suitable now that the scope of the Credit Scheme has been enlarged so as to include a variety of requirements that may need to be obtained from different sources.

The following procedure is, therefore, authorised for dealing with applications by farmers and others who have a banking account:—

(1) Upon approval of an application, the Committee will notify the applicant and his banker, using the Forms B. 1 and C. 1, sent with this Memorandum, and the Bank will, on application, credit the applicant with the approved amount, or any smaller amount that he may specify.

(2) The applicant will order his requirements in the usual way, and settle the account(s) direct with the dealer(s) by drawing on the Bank up to the amount authorised by the Committee.

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* Not here printed.

(3) The applicant will forward the receipted invoice(s) to the Committee for scrutiny and subsequent return to him. A comparison of the invoice(s) with the particulars of the approval will afford a safeguard against the use of the credit for other than approved purposes, and Committees should therefore, on receiving the Bank's notification of the grant of credit, call for the invoices if not already in their hands.

In the case of applicants who have no banking account and do not wish to open one, it will be necessary to continue the existing procedure, but it is not anticipated that such cases will give rise to any difficulty.

2. *Insurance and Re-sale of Purchases.*—The question has been raised as to whether purchases made under the Credit Scheme should be insured, and also as to whether purchasers should be permitted to re-sell their purchases without any restriction.

With regard to the first point, the Board are of opinion that the purchaser should insure in all cases where it is the custom to do so, and the insurance can be effected at a reasonable rate. The Committee may use their discretion as to whether or not insurance should be made a condition of the grant of credit.

The question of re-sale calls for a similar exercise of discretion, and the Board refrain from laying down a definite rule. In cases where credit is given for the purchase of live-stock, other than working horses, eventual re-sale may follow in the ordinary course of business, and it would seem unnecessary in such cases to require that the Committee should be informed of the sale.

Where, however, credit is given for the purchase of *e.g.*, a plough, or a working horse, re-sale before the advance is repaid might be deemed to be a breach of the implied understanding between the Committee and the applicant. In such cases, therefore, the Committee might reasonably attach a condition to the grant of credit, requiring the applicant to re-pay the advance forthwith in the event of a sale being effected before the obligation to re-pay had matured.

Committees will, no doubt, be able to act without further directions on the general principle indicated above, and it will not be necessary to enter into correspondence with the Department on particular cases unless some fresh point should arise.

Provision is made in the Forms for the insertion of appropriate conditions as to insurance and re-sale where they are thought desirable.

THE following Notice, dated 27th November, 1917, has been issued by the Board :—

Training of Forewomen to Supervise the Planting of Forest Trees.

As the result of an inquiry conducted by the Board of Agriculture and Fisheries, it appears that there are in the hands of nurserymen in this country some ten million forest-trees which will be destroyed if they cannot be planted out into the forest during the coming planting season. In order to avoid such waste the Board have under consideration a scheme for training forewomen to supervise planting operations, and for organising gangs of women planters for landowners who desire to undertake planting operations. Inquiries should be addressed to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. 1.

The Oats Products (Postponement of Date) Order, 1917.

AN Order (No. 1200), dated the 24th November, 1917, has been made by the Food Controller to the effect that the Oats Products (Retail Prices) Order, 1917 (hereinafter called the Principal Order), shall be amended as follows:—

1. In Clauses 1 and 8 of the Principal Order, "the 31st December, 1917" shall be substituted for "the 26th November, 1917."

2. Copies of the Principal Order, hereafter to be printed under the authority of H.M. Stationery Office, shall be printed with the substitutions provided for in Clause 1 of this Order, and the Principal Order shall take effect as if it had been originally made with such substitutions.

The Meat (Control) Order, 1917.

AN Order (No. 1203) dated November, 1917, respecting the Control of Meat, has been made by the Food Controller, Part I. of which provides for the Registration of Retail Meat Dealers and Keepers of Slaughterhouses.

Part II. of the Order deals with the licensing of Live Stock Auctioneers and Cattle Dealers, and contains the following provisions:—

13. *Licensing of Live Stock Auctioneers.*—(*a*) A person shall not at any time after the 31st December, 1917, sell cattle by auction unless he is the holder of a licence granted by the Food Controller authorising him to sell cattle by auction.

(*b*) Applications for a licence under this clause shall be made before the 3rd December, 1917, to the Live Stock Commissioner for that area in which the applicant usually resides, or to such other person as the Food Controller may prescribe.

14. *Licensing of Cattle Dealers.*—(*a*) A person shall not at any time after the 31st December, 1917, deal in any cattle unless he is the holder of a licence granted by the Food Controller authorising him to deal in cattle.

(*b*) Applications for a licence under this clause shall be made before the 3rd December, 1917, and in the case of an applicant usually residing in Great Britain to the Live Stock Commissioner for that area in which the applicant usually resides, and in any other case to the Live Stock Commissioner for the area of the port at which the applicant usually ands cattle brought by him into Great Britain for purposes of sale, or to such other person as the Food Controller may prescribe.

(*c*) For the purposes of this clause a person shall be deemed to deal in cattle if, as a regular and substantial part of his business, he buys cattle for the purpose of resale and re-sells within 28 days of his purchase, or if he buys or sells cattle by commission.

(*d*) Notwithstanding anything contained in this clause a person who is for the time being licensed under this Order to sell cattle by auction shall be entitled to buy and sell cattle on commission.

15. *Mode of Application for a Licence.*—Every application for a licence shall be made on a form to be prescribed by the Food Controller, and every applicant shall furnish upon such form a true statement of the particulars required for completing the form, which statement shall be signed by the applicant or by his authorised agent.

16. *Revocation of Licences.*—Any licence issued under this part of this Order may be made subject to such conditions as the Food Controller may determine and may at any time be revoked by the Food Controller.

17. *Information and Inspection.*—The holder of any licence issued under this Part of this Order, and his servants or agents, shall keep or cause to be kept at some convenient place accurate records as to the trade or business in respect of which he is licensed under this Order, together, with all relevant books, documents and accounts, and shall comply with any directions given by or under the authority of the Food Controller as to the form and contents of such record ; and the holder shall also observe such directions as to the trade or business in respect of which he is licensed as may be given to him from time to time by or under the authority of the Food Controller, and shall make such returns and furnish such particulars as to his trade or business as may from time to time be required, and shall permit any person authorised by the Food Controller to inspect all relevant books, documents and accounts.

18. *Custody of Licence*—Every licence issued under this Part of this Order shall be carried with him by the holder whenever engaged in selling cattle as live stock auctioneer or as cattle-dealer, as the case may be, and every licence shall be produced by the holder upon the demand of any person authorised by the Food Controller.

The following terms are defined in the Order :—

"Live Stock Commissioner" shall mean as respects any area, the Live Stock Commissioner appointed for that area by the Food Controller.

"Cattle" shall include in addition to cattle usually so called, ram, ewe, wether, lamb, goat and swine

"Meat" shall mean any meat obtained from cattle so defined.

The Seeds, Nuts and Kernels (Requisition) Order, 1917.

AN Order (No 1226) dated the 29th November, 1917, has been made by the Food Controller, under which he takes possession of all oleaginous seeds, nuts and kernels of the varieties mentioned below, which are in the United Kingdom on the 1st December, 1917, except in the case of stocks of a person who, at the close of business on the 30th November, 1917, does not hold more than 5 tons of any one variety

Varieties covered by the Order.—Babassu seed, castor seed, copra, cotton seed, gingelly (sesame seed), ground nuts (undecorticated), ground nuts (decorticated), hemp seed, illipe, kapok seed, linseed, mowrah seed, niger seed, palm kernels, poppy seed, rape seed, shea nuts, soya beans, sunflower seed.

The Oils, Oil Cakes and Meals (Requisition) Order, 1917.

AN Order (No. 1224) dated 28th November, 1917, has been made by the Food Controller, under which all oils obtained from oleaginous seed, nuts and kernels and all oil cakes or meals, and residues, shall be placed at his disposal as from 30th November, 1917.

Agricultural Wages Board.

THE Board of Agriculture and Fisheries, after consultation with the Ministry of Labour, have established the Agricultural Wages Board for England and Wales under the provisions of Part II. of the Corn Production Act, 1917. The Board, in accordance with the Regulations made on the 8th November, consists of 39 members, of whom seven are appointed as impartial persons and the remainder as representatives of the interests of employers and workers respectively, in equal numbers. Of the sixteen representatives of employers, the Royal Agricultural Society, the National Farmers' Union, the Central Chamber of Agriculture, and the Welsh Agricultural Council, were each invited to elect two members, and of the representatives of workers, the National Agricultural Labourers' and Rural Workers' Union were invited to elect six, and the Workers' Union two. The remaining representative members have been nominated by Mr. Prothero after consultation, in regard to the representatives of workers, with Mr. Roberts. The Board is constituted as follows :—

APPOINTED MEMBERS

The Rt. Hon. Sir Ailwyn Fellowes, K.C.V.O., K.B.E., President of the Board of Agriculture and Fisheries, 1905–6 (*Chairman*).

Sir R. Henry Rew, K.C.B., Assistant Secretary to the Board of Agriculture and Fisheries (*Deputy-Chairman*).

The Rt. Hon. F. D. Acland, M.P., Parliamentary Secretary to the Board of Agriculture and Fisheries, 1915–16.

The Rt. Hon. the Lord Kenyon, K.C.V.O., President of the North Wales University College.

Mr. C. S. Orwin, Director of the Institute of Research in Agricultural Economics, Oxford.

Mrs. L. Wilkins, O.B.E., Author of "Small Holdings," Chairman of the Training Committee of the Farm and Garden Union.

Mr. W. B. Yates, Umpire under Part II. of the National Insurance Act, 1912 ; late Chairman of Trade Boards.

REPRESENTATIVE MEMBERS.

(a) *of Employers.*

Mr. Colin Campbell, Stapleford Hall, Newark, Notts.
Mr. John Evens, Burton, near Lincoln.
Mr. W. S. Gibbard, Strixton, Wellingborough, Northants.
Mr. Robert W. Hobbs, Kelmscott, Lechlade, Gloucester.
Mr. M. H. Holman, Restronguet, Penryn, Cornwall.
Mr. S. Kidner, Bickley, Milverton, Somerset.

Mr. W. S. Miller, Forest Lodge, Brecon.
Mr. A. Moscrop, Thorganby Hall, West Cottingwith, Yorks.
Mr. F. Ivo Neame, The Offices, Maonade, Faversham, Kent.
Mr. H. Overman, Kipton House, Weasenham, Swaffham, Norfolk.
Mr. H. Padwick, C.B.E., The Red House, West Ashling, near Chichester, Sussex.
Mr. R. G. Patterson, Acton Hill, Stafford.
Mr. G. G. Rea, Doddington, Woeler, Northumberland.
Mr. R. R. Robbins, Hollycroft, Sipson, Yiewsley, Middlesex.
Mr. John Roberts, Tyddyn Parc, Denbigh.
Mr. S. T. Rosbotham, Stanley Farm, Bickerstaffe, Ormskirk, Lancs.

(b) *of Workers.*

Councillor John Beard, Planet Buildings, Central Place, Corporation Street, Birmingham.
Mr. George Dallas, 32, Charing Cross, Whitehall, London, S.W. 1.
Mr. George Edwards, 7, Lichfield Street, Queen's Road, Fakenham, Norfolk.
Mr. Robert Green, Tudor House, Sidcup, Kent.
Mr. J. T. Curd, Holdenhurst, Christchurch, Hants.
Mr. G. E. Hewitt, Waterloo Place, Horsham, St. Faiths, Norfolk.
Mr. T. G. Higdon, Burston, Diss, Norfolk.
Mr. W. Holmes, 15, Somerset Road, Tottenham, London, N. 19.
Mrs. M. J. Jenner, 4, Williams Cottages, The Limeworks, Oxted, Surrey.
Mr. Thomas Lovell, 20, Victoria Terrace, Alcombe, near Minehead, Somerset.
Mr. G. Nicholls, 162, Lincoln Road, Peterborough.
Mr. Haman Porter, Weston-on-the-Green, Bicester, Oxon.
Mr. Robert Richards, University College of North Wales, Bangor.
Councillor W. R. Smith, Bellevue, St. Clement's Hill, Norwich.
Mr. R. B. Walker, Wensum House, Hempton, Fakenham, Norfolk.
Mr. Denton Woodhead, Allwood House, Northallerton, Yorkshire.

The offices of the Agricultural Wages Board are at 80, Pall Mall, London, S W. 1.

First Meeting of the Agricultural Wages Board.

THE first meeting of the Agricultural Wages Board was held on the 6th December, 1917, at its offices at 80, Pall Mall, S.W. 1., Sir Ailwyn Fellowes presiding. The President of the Board of Agriculture and Fisheries and the Minister of Labour attended at the opening of the proceedings.

Mr. Prothero, in offering his good wishes to the Board, referred to the consideration which had been given to its constitution. The 32 representative members came from as many as 21 different counties, and collectively they possessed very wide and extensive knowledge and experience of the various circumstances of farming and of agricultural employment throughout the country. The Wages Board might be regarded as probably representing the farming interest of the country to a degree which had not previously been attained. He thought the Board were happy in their Chairman and Deputy Chairman, and the other appointed members, who would be in a position to consider the problems presented not only impartially but with a breadth of vision not readily obtainable where personal interests were involved. The responsibility laid upon the Board was very great. The conditions under which the actual tillers of the soil worked and lived must have far-reaching effects on the future of agriculture. If fair remuneration were denied either to employers or to workers the food production of the country could not properly be maintained. If the Wages Board displayed a spirit of moderation and compromise, and aimed at the reconciliation of conflicting interests and the promotion of the common interest, their labours would prove a blessing to the whole agricultural community.

Mr. Prothero went on to announce that he proposed to amend the Provisional Regulations for the constitution of District Wages Committees made by the Board of Agriculture on the 20th November, so as to provide that the representative members of the District Wages Committees should be appointed by the Wages Board instead of by the Board of Agriculture as originally contemplated.

Mr. Roberts, in expressing his pleasure at the establishment of a Wages Board in Agriculture, which he had long advocated, expressed the hope that the harmony evident in the Board's opening proceedings might continue throughout, to the benefit of all concerned in the agricultural industry. The principle of Wages Boards was established by Parliament for the first time in this country in 1909, and everybody must admit that these Boards had justified themselves. Some industries to which the Trade Boards Act had been applied had been quite transformed in character, with great benefit to sections of workers in the community, without prejudicing the industries themselves; indeed, so successful had the legislation proved that their extension in other directions was being generally urged, and it would be his duty, as Minister of Labour, shortly to seek for powers to apply the principle of Trade Boards to every industry where it appeared that labour was not adequately remunerated. One fact which emerged from their experience was that when the representatives came together on these Boards they got to know each other and to understand each other, and that greater harmony prevailed throughout the whole of their relations. He ventured to hope that equally good results would flow from the establishment of a Wages Board in Agriculture, in which he saw the possibility of great improvements in the conditions of the class from which he, himself, came.

The Board settled the rules of procedure at their meetings and proceeded to consider the question of the determination of areas for District Wages Committees. After considerable discussion it was decided that the county should be adopted as the basis for the areas for which District Committees should be set up, and a Committee, consisting of three appointed members, three representatives of employers and three representatives of workers, was appointed to prepare a detailed report, embodying recommendations as to the precise areas of the Committees, to be submitted to the Board at their next meeting, to be held on the 20th December.

Agricultural Returns of England and Wales, 1917. Produce of Crops.

PRELIMINARY STATEMENT showing the estimated total produce and yield per acre of the potato and root crops in England and Wales in the year 1917, with comparisons for 1916, and the average yield per acre of the ten years 1907–1916.

—	Crops.	Estimated Total Produce.		Acreage		Average Estimated Yield per acre.		Average of the Ten Years 1907–1916.
		1917.	1916.	1917	1916.	1917.	1916.	
		Tons	Tons.	Acres.	Acres.	Tons	Tons	Tons.
ENGLAND AND WALES.	Potatoes	**3,339,995**	2,504,516	**507,957**	427,948	**6·57**	5·85	6·16
	Turnips and Swedes	**12,163,624**	12,985,388	**969,131**	932,366	**12·55**	13·93	13·19
	Mangold	**8,481,578**	7,337,678	**387,453**	376,950	**21·89**	19·47	19·26
ENGLAND	Potatoes	**3,142,323**	2,370,095	**473,312**	399,586	**6·64**	5·93	6·28
	Turnips and Swedes	**11,413,923**	12,147,635	**918,313**	879,684	**12·43**	13·81	13·07
	Mangold	**8,263,255**	7,131,711	**375,525**	365,631	**22·00**	19·51	19·29
WALES	Potatoes	**197,672**	134,421	**34,645**	28,362	**5·71**	4·74	5·36
	Turnips and Swedes	**749,701**	837,753	**50,818**	52,682	**14·75**	15·90	15·43
	Mangold	**218,323**	205,967	**11,928**	11,319	**18·30**	18·20	18·07

NOTE.

The total production of potatoes in England and Wales in 1917 is estimated at 3,339,995 tons, or 835,000 tons (33 per cent.) more than in 1916, and is the largest crop recorded since returns of the production of crops were first collected in 1885. The yield per acre, 6·57 tons, is three-fourths of a ton heavier than last year, two-fifths of a ton above the average of the last ten years, and has only been exceeded four times in the last 30 years. The yield per acre of turnips and swedes is estimated at 12·55 tons, or two-thirds of a ton below average, and 1⅜ tons less than in 1916; the decline being due to the unfavourable weather of the early summer in the north-eastern counties. The total production, 12,163,624 tons, is 820,000 tons smaller than last year, but 350,000 tons heavier than in 1915. Mangolds, on the other hand, are a very satisfactory crop; the total production, 8,481,578 tons, is 1,140,000 tons greater than in 1916, and the yield per acre, 21·89 tons, is about 2½ tons heavier than last year and than the ten-year average. Taking both kinds of roots together, there is a larger quantity available this year than in 1916.

The following Order (No. 1199), dated the 23rd November, 1917, has been made by the Food Controller:—

Potatoes Order, 1917: General Licence.

The Food Controller hereby authorises, notwithstanding the provisions of Clause 10 of the Potatoes Order, 1917, sales of and dealings in potatoes of any of the varieties mentioned in such Clause ("King Edward," "Arran Chief," "Langworthy," "What's Wanted," and "Golden Wonder") except sales of and dealings in any such varieties grown in any of the counties of York, Lincoln, Cambridge, Norfolk, Huntingdon, Hertford, Warwick, Worcester and Notts by a grower whose whole acreage of potatoes of all varieties in those counties in the year 1917 exceeds 5 acres.

Corresponding Price under the Price of Milk Orders, 1917.

THE following Circular has been issued by the Ministry of Food :—

SIR (s),—I am directed by the Food Controller to inform you that a Press Notice was issued on the 24th March, 1917, in the following words :—

> "The Food Controller is issuing an Order amending the Price of Milk Orders, 1917, so that the increase in price sanctioned by those Orders is based on the summer prices of 1914 instead of those of 1913."

No such amending Order was in fact issued, and the two Orders already quoted, Nos. 68 and 160, governed the price of milk up to the 30th September, 1917, when the Milk Order, 1917, came into operation.

I am to say that in view, however, of the Press Notice of March, 1917, no proceedings should be instituted for contraventions of the Price of Milk Orders from 1st April to 30th September, 1917, unless the price charged would exceed the permitted maximum as determined with reference to the corresponding price in the summer months of 1914.

As regards pending cases, if any, it is the desire of the Ministry that the summons should be withdrawn if it appears by reference to the summer prices 1914 that no contravention can be established.

I am, etc.,

W. H. BEVERIDGE.

Co-operative Milk Depots.

A SCHEME for the establishment of a number of Co-operative Milk Depots in England and Wales is being promoted by the Board of Agriculture through the Agricultural Organisation Society. The matter has been taken up with especial enthusiasm by the farmers in Wales; and the members of the South Carnarvonshire District Committee have expressed the opinion that Pwllheli would be an ideal centre for a depot, "as very little milk is being exported from the district at present."

Children as Milkers.

THE Carnarvon Agricultural Education Committee has decided to give instruction in milking to boys and girls over 12 years of age attending the Elementary Schools of the county. A dummy udder is used for preliminary practice, and the farmers of the neighbourhood provide facilities for more advanced work. At one place 40 children are being taught, and the teacher has reported to the Local Commissioner of the Food Production Department that the youngsters are very keen to learn.

Importation of Agricultural Machinery: New Regulations.

IT is officially announced that in pursuance of the powers conferred upon them by the several Proclamations prohibiting the importation of certain articles into the United Kingdom, the Board of Trade will issue licences for the importation of machinery for agricultural and dairy purposes from the U.S.A. and Canada on the recommendation of the Agricultural Machinery Department of the Ministry of Munitions, 8, Northumberland Avenue, London, W.C. 2.

Persons or firms desiring to import machinery and implements for these purposes must apply to the Agricultural Machinery Department of the Ministry of Munitions for the necessary permit to arrange for the import of such articles.

Permits, when granted, will be forwarded to the Board of Trade, Department of Import Restrictions, 22, Carlisle Place, S.W. 1., for the issue of the necessary licences.

Such imports will be carried at Government rates of sea freight, and their price to users must not exceed the total cost of the article landed in this country, plus 25 per cent.

The foregoing provisions as to Government freight rates and control of prices do not apply to articles retailed at 40*s*. or under

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Transfer of Individual Men to Agricultural Companies.

THE following Memorandum (F.P. 140), dated the 11th December, 1917, has been addressed to the Agricultural Executive Committees in England and Wales by the Food Production Department of the Board :—

The following extract from an Instruction, dated the 7th instant, addressed to Headquarters, all Commands and London District, by the War Office, is sent for information.

> "At present there are a very large number of applications being made by the local agricultural authorities to the Food Production Department for individual men of low category serving at home to be made available as skilled men for the special agricultural programme.
>
> "The names have to be passed from the War Office to Commands and a report asked for so that the Food Production Department can be informed of the result, and from there the particulars are sent to the local authorities.
>
> "To save needless correspondence and to accelerate cases being dealt with it is being arranged by the Food Production Department that their local representatives will bring to the notice of the Agricultural Commandants at distribution centres the names and addresses of men of low category serving at home whom they have been asked for.
>
> "The Commandants will forward the names direct to the headquarters of the *Command in which the men are serving* indicating to which Agricultural Company the men should be posted if they can be made available for the special programme.
>
> "The ordinary procedure will then be followed as to transferring and posting the men, between Commands."

As a result of this arrangement, any application received by this Department with regard to the transfer of a man to an Agricultural Company will be transmitted to the Agricultural Executive Committee concerned.

The arrangement set out in the Instruction does not apply to men in Category "A" or to men serving abroad, which applications will be dealt with by this Department as heretofore. In this connection it should be noted that, as regards men serving overseas, applications can only be considered respecting men in medical categories below "A." Men in Category "A" and in the Mechanical Transport of the Army Service Corps are not at present available for transfer to Agricultural Companies

Notice to Sellers of Cattle and Horse Foods.

MR. PROTHERO desires to draw attention to the danger of using as food for horses or cattle any foods or mixtures containing poisonous seeds such as castor seed, Rangoon bean, lathyrus, etc. Seeds that have been removed from those required for crushing in oil mills are sometimes sold for use in the composition of feeding stuffs, but, in order to avoid the risk of poisoning stock it is necessary that all grains of unusual appearance, especially foreign grains, should be submitted to qualified experts for identification before being used for this purpose. It should be borne in mind that a seller of a feeding stuff which contains deleterious ingredients is not only liable to prosecution under the Fertilisers and Feeding Stuffs Act, 1906, but may also be held liable for injury caused to stock by the use of such foods.

Leaflets in 1917.

SINCE the date of the list given on p. 483 of the *Journal* for July, 1917, the following Leaflet has been issued in the Permanent Series :—

No. 311.—*Restriction on Raising of Agricultural Rents.*

In addition, the information in the following Leaflets has been revised and brought up to date :—

No. 13.—*Acorn Poisoning.*
,, 29.—*Swine Fever.*
,, 52.—*The European Gooseberry Mildew.* This has been re-written.
,, 57.—*External Parasites of Poultry.*
,, 83.—*Preservation of Eggs.*
,, 95.—*Ringworm in Cattle.*
,, 97.—*Farmers' Co-operative Societies*
,, 113.—*Dry Rot.* This Leaflet has been entirely re-written.
,, 117.—*Black Leg or Potato Stem-Rot.* This Leaflet has been entirely re-written.
,, 122.—*The Cabbage Root Fly.* This Leaflet has been entirely re-written.
,, 132.—*Slugs and Snails.*
,, 137.—*Varieties of Scab in Potatoes.*
,, 170.—*The Use of Lime in Agriculture.*
,, 178.—*Onion Mildew.*
,, 215.—*How to Obtain an Allotment or a Small Holding.*
,, 232.—*Corky Scab of Potatoes.* This Leaflet has been entirely re-written.
,, 238.—*Leaf Diseases of Celery.* This Leaflet has been entirely re-written.
,, 250.—*Fruit Bottling for Small Holders.* This Leaflet has been entirely re-written.

No. 259.—*Swift Moths.*
,, 291.—*The Food Value of Acorns and Beech Mast.*
,, 294.—*Poultry Houses and Appliances for Allotment Holders, Cottagers and Others.*
,, 299.—*Storage of Potatoes and Other Vegetables for Winter Use.* (This was formerly Special Leaflet No. 15 and has now been re-written to include in it Food Production Leaflet No. 6.)
,, 309.—*Suggestions to Allotment Holders for Autumn Treatment of Land.* (Formerly Special Leaflet No. 1.)

The following Food Production Leaflets have been issued:—

Food Production Leaflet No 1.—*Hints for Farmers on Growing Root Seeds for Home Use.*
,, ,, 4—*Jam Making in War Time.*
,, 5—*Notes on Breaking Up Grass Land*
,, ,, 7—*Maintenance of Supplies of Hay and Fodder Crops.*
,, ,, 8—*Economy in the Use of Vegetable Seeds.*
,, ,, 9—*Fruit and Vegetable Drying.*
,, ,, 10.—*Cultivation of Rye as a Grain Crop*
,, ,, 11,—*Hints on Purchasing "Seed" Potatoes*
,, ,, 12.—*Grease Banding of Fruit Trees.*
,, ,, 13—*Comparative Money Values of Feeding Stuffs.*
,, 17—*Economy in the Feeding of Horses.*
,, 23—*Blast Furnace Flue Dust as a Potash Manure.*
,, ,, 25—*Economy in the Feeding of Dairy Cows.*

The following Food Production Leaflet has been re-written:—

Food Production Leaflet No 3—*Notes on Poultry Feeding.* (Formerly Special Leaflet No. 2.)

The following Special Leaflet has been issued:—

Special Leaflet No. 78.—*The Profitable Utilisation of Surplus Milk.*

The following Special Leaflets have been revised:—

Special Leaflet No 31.—*The Making of Fruit Pulp.*
,, ,, 35.—*Transport of Agricultural Produce.*
,, ,, 48.—*Compound Manures*
,, ,, 61.—*Transport of Agricultural Requisites and Produce*
,, ,, 62—*Co-operation and the Supply of Farm Implements* This leaflet has been entirely re-written
,, ,, 63.—*Carriage of Fruit and Empties.*

The following Leaflets, formerly issued in the series of Special Leaflets, have now been added to the Permanent Series:—

No. 313.—*The Cultivation of Parsnips.* (Formerly Special Leaflet No. 70.)
,, 314—*The Manurial Value of Shoddy.* (Formerly Special Leaflet No. 27.)

The following Leaflets, formerly issued in the Series of Special Leaflets, have been transferred to the Series of Food Production Leaflets :—

Food Production Leaflet No. 2 —*Credit for Farmers*. (Formerly Special Leaflet No. 72.)
,, ,, 15 —*The Use of Sulphate of Ammonia as Manure*. (Formerly Special Leaflet No. 57.)
,, ,, 16.—*Bracken as Litter*. (Formerly Special Leaflet No. 38.)
,, ,, 19.—*Pig Feeding*. (Replaces Special Leaflets Nos. 16 and 71, and Bulletin C9 of the Food Production Department.)

A Memorandum : Owners of Woodland and the Income Tax, Excess Profits Duty, and Death Duties, compiled under the authority of the Board of Inland Revenue, and setting out the basis upon which an assessment to Income Tax upon an owner of woodland is made, and his liability to Excess Profits Duty and Death Duties, has also been issued and can be had free on application to the Secretary to the Board of Agriculture (Publication Branch), 3, St. James's Square, S W. 1.

The Board desire to give notice that they have discontinued the practice of sending copies of future Leaflets to subscribers to the "*Journal of the Board of Agriculture*" Readers are invited to avail themselves of the arrangement which the Board have made for sending Leaflets, as issued, to persons interested, particulars of which may be obtained on application to the Secretary, Board of Agriculture and Fisheries (Publications Branch), 3, St. James's Square, London, S W 1.

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for November, 1917, issued by the International Institute of Agriculture, contains estimates of the production of cereal crops in the Northern Hemisphere. The countries in respect of which it is possible to give forecasts are as follows :—In *Europe*—Spain, France, Great Britain, Ireland, Italy, Luxemburg, Norway, Netherlands, Sweden, Switzerland ; in *America*—Canada, United States ; in *Asia*—British India, Japan ; in *Africa*—Algeria, Egypt, Tunis,

Wheat —The total production in the above-mentioned countries is estimated to amount to 233,469,000 qr. in 1917, against 236,339,000 qr in 1916, a decrease of 1·2 per cent., while the area sown was smaller by 4·6 per cent.

Rye.—In the above-mentioned countries in Europe and America, except Great Britain, the yield is placed at 17,174,000 qr. this year, against 18,163,000 qr. last year, a decrease of 5·4 per cent., but the area sown was larger by 4·3 per cent.

Batley.—The production in the specified countries, excluding British India, is estimated at 70,377,000 qr. in 1917, against 70,047,000 qr. in 1916, or an increase of 0·5 per cent., the area sown being greater by 4·8 per cent.

Oats.—The total yield in the specified countries, with the exception of British India, Japan and Egypt, is placed at 274,999,000 qr. this year, or an increase of 15·5 per cent. compared with last year, when it amounted to 238,022,000 qr., while the area sown showed an increase of 8·3 per cent.

Maize.—The total production in Spain, Italy, Switzerland, Canada, and the United States is estimated to amount to 386,253,000 qr. in 1917, against 314,893,000 qr. in 1916, an increase of 22·7 per cent., the area sown being greater by 13·5 per cent.

France.—According to the official report for October, the weather was generally wet, but fine weather continued in the Mediterranean region. Field work and seeding have consequently been hindered to a certain extent in some departments, but in others the work has progressed satisfactorily. Potato lifting is finished in a number of departments; despite damage through disease, the yield is better than last year. (*The London Grain, Seed and Oil Reporter*, November, 1917.

Canada.—According to a report dated 30th November, received from the High Commissioner for Canada, the fine weather which has been prevailing recently in Western Canada has enabled threshing of the grain crops to be practically completed, and it is estimated that not more than three per cent. of the work now remains to be done.

According to a preliminary estimate issued by the Census and Statistics Office, the production of the corn and linseed crops in Canada this year is estimated as follows (1916 figures in brackets): Wheat, 249,147,500 bush. (262,781,000); barley, 59,310,650 bush. (42,770,000); oats, 439,823,100 bush. (410,211,000); rye, 4,194,950 bush. (2,876,400); and linseed, 7,455,470 bush. (8,259,800). The estimated yields per acre are as follows: Wheat, 16·79 bush (17·10); barley, 24·80 bush. (23·72); oats, 33 bush. (37·30); rye, 19·80 bush. (19·38); and linseed, 8·11 bush (12·56).—(*Monthly Bulletin of Agricultural Statistics*, September, 1917).

United States.—According to the final estimate of the Bureau of Statistics of the Department of Agriculture, issued on 11th December, the production of crops in 1917 was as follows (1916 figures in brackets): Wheat, 650,830,000 bush. (639,880,000); barley, 208,980,000 bush. (180,930,000); oats, 1,587,300,000 bush. (1,252,000,000); rye, 60,145,000 bush. (47,383,000), maize, 3,159,500,000 bush. (2,583,200,000); and linseed, 8,473,000 bush. (15,455,000).—(*The London Grain, Seed and Oil Reporter*, 12th December.)

Live Stock in Russia.—The numbers of live stock in Russia in Europe (47 governments) in 1916 were as follows (the corresponding numbers in 1914 being shown in brackets): Horses 23,007,539 (20,600,608); cattle 37,562,954 (28,926,122); sheep, 59,950,742 (37,691,318); goats, 1,558,041 (819,135); pigs, 16,299,508 (12,132,524). (*International Crop Report and Agricultural Statistics*, November, 1917.)

Live Stock in New Zealand.—The numbers of live stock on the 31st January, 1917, are as follows (the numbers on the 31st January, 1916, being shown in brackets): Horses, 367,167 (371,331); cattle, 2,502,700 (2,417,491); pigs, 278,186 (297,501). The number of sheep on the 30th April, 1917, was 24,753,324 compared with 24,788,150 on the same date in 1916. (*International Crop Report and Agricultural Statistics*, November, 1917.)

Agricultural Conditions in England and Wales on 1st December.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st December, state that, except in Wales and the north-west, the weather during the past month has been favourable for autumn cultivation and the sowing of crops, especially on the eastern side of the country. Sowing in the important corn-growing counties has consequently been pushed on rapidly, and is more forward than last year, and, in the north-east more particularly, is often more advanced than usual. In the west, where the season has been much later, work is not so well advanced, but progress was made during the latter part of the month.

About 70 per cent. of the area intended for wheat has already been sown; and, as compared with 1st December last year, the area actually seeded appears to be from 10 to 15 per cent. greater, this percentage being exceeded in the north-east. Generally speaking, most of the work was done under favourable conditions, and where the crop is up, it is everywhere a healthy and satisfactory plant. In some parts of the west and Wales, however, much of the land was still too wet to be worked. Other autumn-sown crops also appear quite satisfactory. Of winter barley and beans rather less is reported to have been sown, and of oats and rye about the same, as at this time last year; but, as with wheat, slightly more has been got in in the east than in the west.

Potatoes have now practically all been harvested, except in some western districts; and, with the same exceptions, the tubers are generally sound. The total production on farms is returned at 3,340,000 tons—835,000 tons, or 33 per cent., more than last year, and the largest crop raised since returns were first collected in 1885. The yield per acre, 6·57 tons, is also very good. Turnips and swedes produced 12,164,000 tons, or 12·55 tons per acre; this is below the average, owing to a shortage mainly in the north-eastern counties. The quality of these roots is variable; turnips being frequently rather poor, but swedes are, in most districts, better. Mangolds are a large crop, and generally of good quality; their yield amounts to 8,482,000 tons, or 21·89 tons per acre, which is 2½ tons above average. The total production of these roots is thus greater than last year, turnips and swedes being 820,000 tons less, but mangolds being 1,140,000 tons more.

Live stock have generally done well during the month, owing to the mild open weather, which has also been of value in preventing early inroads into the stocks of winter food. The latter is not too plentiful in the eastern part of the country, but is generally expected to be sufficient in the west.

Labour is still short, but the situation is certainly no worse than a month ago.

The following local summaries give further details regarding agricultural labour in the different districts of England and Wales:—

Agricultural Labour in England and Wales during November.

Northumberland, Durham, Cumberland and Westmorland.—The supply of labour is still short in the eastern counties, especially casual labour for threshing and turnip-pulling, but work is now well on, and the position has improved. In Cumberland and Westmorland the supply is fairly satisfactory.

Lancashire and Cheshire.—There is a shortage of labour, especially skilled, but with the assistance of casual labour of various kinds the necessary work has been performed.

Yorkshire.—The position as regards labour seems to have improved; in many districts the supply is said to be about sufficient, and the very favourable weather has allowed farmers to get well forward.

Shropshire and Stafford.—Labour is still deficient, but the position has been greatly relieved by the assistance rendered by soldiers and women.

Derby, Nottingham, Leicester, and Rutland.—The supply of labour is deficient generally.

Lincoln and Norfolk.—The supply of labour is generally deficient.

Suffolk, Cambridge, and Huntingdon.—The supply of labour is still deficient, but soldiers and women have helped considerably, and the favourable weather has allowed the most to be made of the short supply.

Bedford, Northampton, and Warwick.—Labour is rather deficient, but considerable assistance has been rendered by soldiers and women, and compared with last year the position shows some improvement.

Buckingham, Oxford, and Berkshire.—The supply of labour is still short, but great assistance has been given by soldiers and women.

Worcester, Hereford, and Gloucester.—There is a general shortage of labour, but this has been met by the assistance of women and soldiers.

Cornwall, Devon, and Somerset.—The supply of labour is still short, but the position is no worse than last month.

Dorset, Wiltshire, and Hampshire.—The supply of labour is still short, but with the aid of women and soldiers farmers have managed to cope with the work.

Surrey, Kent, and Sussex.—There is a general shortage of labour, but help has been rendered by women and soldiers.

Essex, Hertford, and Middlesex.—The situation is somewhat easier, women and soldiers having been of great assistance.

North Wales.—The supply of labour is deficient in most districts, but the shortage is not felt so keenly at present, now that nearly all the crops have been secured.

Mid Wales.—The supply of labour is deficient; casual labourers are very difficult to obtain; but the position is no worse than a year ago, as soldier labour is available.

South Wales.—The supply of labour is still short.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st December, 1917, certain diseases of animals existed in the countries specified:—

Denmark (*month of September*).—Anthrax, Swine Erysipelas.

France (*for the period 31st October—3rd November*).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders and Farcy, Rabies, Sheep-pox, Swine Erysipelas, Swine Fever.

Germany (*for the period 1st—15th November*).—Foot-and-Mouth Disease, Glanders and Farcy, Swine Fever.

Holland (*month of October*).—Anthrax, Foot-rot, Swine Erysipelas.

Italy (*for the period 29th October—4th November*).—Anthrax, Black-leg, Foot-and-Mouth Disease (482 outbreaks), Glanders and Farcy, Rabies, Sheep-scab, Swine Fever.

Norway (*month of October*).—Anthrax, Black-leg.

Russia (*month of March*).—Anthrax, Cattle-plague, Foot-and-Mouth Disease (6,779 animals), Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Swine Fever, Swine Erysipelas.

Sweden (*month of September*).—Anthrax, Black-leg, Swine Erysipelas.

Switzerland (*for the period 5th—11th November*).—Anthrax, Black-leg, Swine Fever.

No further returns have been received in respect of the following countries: Austria, Belgium, Bulgaria, Hungary, Montenegro, Rumania, Serbia, Spain.

The Weather in England during November.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 3rd Nov.:								
England, N.E. ...	42·6	—3·4	0·41	10	— 5	4	1·7	0·5
England, E.	43·8	—3·0	0·35	9	- 7	5	2·6	0·0
Midland Counties ...	43·8	—1·8	0·58	15	—13	5	2·2	0·0
England, S.E. ...	46·5	-1·8	0·77	20	— 3	5	2·5	—0·3
England, N.W. ...	44·4	—2·3	0·98	25	+ 1	6	1·0	—1·2
England, S.W. ...	40·7	-1·4	1·50	38	+ 9	6	1·8	—0·7
English Channel ...	50·1	—1·4	1·84	47	+23	7	1·8	—1·3
Week ending 10th Nov.:								
England, N.E. ...	44·3	—0·5	0·49	12	— 2	5	2·6	+0·6
England, E.	44·0	—1·2	0·50	13	0	5	2·9	+0·4
Midland Counties ..	44·4	0·0	0·59	15	2	5	2·7	+0·7
England, S.E. ...	45·6	—0·5	0·51	13	- 8	4	3·1	+0·7
England, N.W. ..	40·0	+0·3	1·26	32	+ 9	5	2·4	+0·6
England, S.W. ..	47·1	0·0	0·96	24	— 4	5	2·6	+0·4
English Channel ...	50·1	—0·7	0·63	16	—12	6	2·5	—0·1
Week ending 17th Nov:								
England, N.E. ...	44·2	+1·6	0·01	0	—14	1	2·5	+0·6
England, E.	42·0	—1·0	0·03	1	—14	3	1·9	—0·3
Midland Counties ...	42·6	+0·5	0·02	1	—13	1	1·5	—0·4
England, S.E. .	42·9	—1·4	0·01	0	—17	1	1·8	—0·6
England, N.W. ..	44·7	+1·4	0·15	4	—16	4	2·2	+0·3
England, S.W. ..	44·7	—0·3	0·25	6	—16	2	1·3	—1·1
English Channel ..	49·3	+0·3	0·13	3	—19	3	2·8	+0·1
Week ending 24th Nov:								
England, N.E. ...	49·6	+8·1	0·49	12	+ 1	4	1·4	—0·5
England, E.	49·3	+7·7	0·24	6	— 5	3	1·3	—0·4
Midland Counties ...	49·6	+5·7	0·24	6	— 5	2	1·4	—0·2
England, S.E. ...	50·3	+7·3	0·10	3	—11	3	1·0	—0·8
England, N.W. ...	50·0	+7·5	0·64	16	— 4	5	0·4	—1·2
England, S.W. ...	50·3	+6·3	0·18	5	—16	3	0·4	—1·5
English Channel ...	50·7	+2·7	0·12	3	—16	3	0·6	- 1·4

* 1 inch = 2·54 millimetres.

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1915, 1916 and 1917.

Weeks ended (*in* 1917).	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917		1915.		1916.		1917.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan. 6	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
,, 13	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
,, 20	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
,, 27	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb. 3	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
,, 10	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
,, 17	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
,, 24	56	0	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar. 3	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
,, 10	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
,, 17	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
,, 24	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
,, 31	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl. 7	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
,, 14	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
,, 21	56	5	55	3	84	10	31	5	52	10	70	6	30	11	31	8	59	8
,, 28	58	3	56	3	81	1	32	7	53	5	69	5	31	5	32	4	58	6
May 5	60	5	55	7	77	7	33	3	53	1	64	4	32	4	32	10	54	9
,, 12	61	7	55	5	78	0	34	0	53	5	64	11	32	5	33	1	55	2
,, 19	62	0	55	0	77	11	34	1	52	10	64	10	32	8	33	0	55	2
,, 26	61	11	54	7	78	0	34	8	52	9	64	9	32	7	33	4	54	11
June 2	61	9	53	3	78	0	35	4	53	9	65	11	32	5	33	3	54	11
,, 9	60	1	51	2	78	0	34	5	52	8	67	7	32	4	32	7	55	0
,, 16	56	1	48	10	78	2	34	3	50	9	75	6	31	9	32	1	55	1
,, 23	52	0	47	6	78	1	34	4	49	10	75	0	31	9	31	3	55	2
,, 30	49	5	46	3	78	3	35	3	49	1	73	11	31	1	30	10	55	1
July 7	50	1	46	3	78	1	34	7	45	6	69	5	31	6	30	8	55	2
,, 14	52	7	48	11	78	2	35	8	47	5	70	10	31	6	31	6	55	1
,, 21	53	10	51	6	78	3	35	10	48	8	72	1	32	1	32	3	55	2
,, 28	55	3	53	5	78	3	36	1	47	2	65	7	31	1	32	5	55	2
Aug. 4	55	4	55	1	78	2	35	7	46	1	73	6	31	5	32	9	55	0
,, 11	55	2	56	7	78	4	37	0	46	11	76	1	31	7	31	2	55	0
,, 18	54	3	58	1	78	7	39	4	48	0	68	11	31	4	30	8	55	6
,, 25	51	11	59	0	76	7	38	3	47	1	70	7	30	0	31	6	54	7
Sept. 1	45	3	59	4	72	1	38	1	48	5	60	4	26	10	30	5	49	0
,, 8	43	0	59	3	71	6	37	11	51	7	59	3	26	8	31	1	46	7
,, 15	42	9	59	11	70	7	39	0	52	6	57	2	26	4	30	9	45	0
,, 22	43	3	59	4	70	8	39	8	53	3	56	10	26	1	30	9	45	8
,, 29	43	5	58	10	70	6	40	4	54	1	58	5	26	5	31	1	44	7
Oct. 6	44	1	59	2	70	8	41	0	54	5	57	9	26	5	30	9	44	9
,, 13	45	9	59	7	71	0	42	3	53	10	58	5	27	1	31	6	44	5
,, 20	48	2	60	9	70	8	44	0	53	8	59	3	28	1	31	11	44	1
,, 27	50	3	62	10	70	10	46	2	54	6	60	1	29	1	32	10	43	0
Nov. 3	51	6	66	7	70	4	47	3	56	2	59	11	30	4	34	0	42	4
,, 10	52	8	69	8	70	3	47	5	58	0	60	2	30	11	35	8	42	1
,, 17	53	6	70	9	70	3	47	11	59	8	60	2	31	3	37	8	43	10
,, 24	54	2	70	8	70	2	48	7	61	8	59	9	31	1	39	7	43	1
Dec. 1	53	7	71	3	70	2	48	11	63	1	59	3	30	11	41	4	44	6
,, 8	52	10	72	1	70	7	47	10	65	6	58	7	30	4	44	1	43	5
,, 15	53	11	73	2			47	5	66	5			30	6	45	10		
,, 22	53	10	74	8			47	2	67	3			30	7	46	5		
,, 29	54	9	75	10			47	5	67	5			30	10	47	4		

NOTE. – Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in November and October, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description	November. First Quality.	November. Second Quality.	October. First Quality.	October. Second Quality.
FAT STOCK :—	per stone.*	per stone.*	per stone.*	per stone.*
Cattle :—	s. d.	s. d.	s. d.	s. d.
Polled Scots	18 3	17 6	17 1	16 4
Herefords	17 8	16 7	16 10	15 9
Shorthorns	17 10	16 4	17 0	15 6
Devons	17 9	16 1	17 2	15 6
Welsh Runts	17 5	16 9	16 7	15 6
	per lb.*	per lb *	per lb.*	per lb.*
	d.	d	d	d.
Veal Calves	15¾	14	15⅛	13⅞
Sheep :—				
Downs	16¼	15¼	16½	14⅞
Longwools	15¾	14¾	15¼	14¼
Cheviots	16¼	15	15⅛	14½
Blackfaced	14¾	14	13¼	13
Welsh	15¼	14	14⅛	13⅛
Cross-breds	16½	15	16	14⅛
	per stone.*	per stone.*	per stone.*	per stone.*
Pigs :—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	18 10	18 3	19 4	18 6
Porkers	19 3	18 6	20 1	19 2
LEAN STOCK :—	per head.	per head	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	50 11	39 14	46 19	36 7
,, —Calvers ...	46 17	38 2	43 11	34 14
Other Breeds—In Milk ...	51 8	37 3	45 11	34 17
,, —Calvers ...	32 0	28 0	—	27 0
Calves for Rearing	4 3	3 5	3 18	3 0
Store Cattle :—				
Shorthorns—Yearlings ...	17 0	14 11	16 12	14 0
,, —Two-year-olds...	26 19	22 19	25 19	21 7
,, —Three-year-olds	35 18	30 3	34 3	28 9
Herefords —Two-year-olds...	28 10	24 13	29 10	24 4
Devons— ,,	27 10	24 2	25 14	22 13
Welsh Runts— ,,	26 19	22 12	25 0	21 19
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	63 9	52 3	63 8	52 7
Store Pigs :—				
8 to 12 weeks old	36 8	26 10	37 4	28 1
12 to 16 ,, ,, ...	60 11	47 2	63 2	49 9

* Estimated carcass weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in November, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.		Leeds.		Liverpool.		London.		Manchester.	
		per cwt.		per cwt.		per cwt.		per cwt.		per cwt.	
		s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
BEEF :—											
English	1st	112	0	112	0	—		112	0	112	0
	2nd	107	6	111	0	—		107	6	107	6
Cow and Bull	1st	109	0	111	0	102	6	107	6	107	6
	2nd	99	6	106	0	84	0	97	0	100	6
Irish : Port Killed	1st	—		111	6	112	0	112	0	111	0
	2nd	—		110	0	106	0	107	6	105	0
Argentine Frozen—											
Hind Quarters	1st	107	6	—		107	6	—		107	6
Fore „	1st	88	6	—		88	6	—		88	6
Argentine Chilled—											
Hind Quarters	1st	107	6	107	6	109	0	107	6	109	0
Fore „	1st	88	6	85	6	90	0	88	6	90	0
American Chilled—											
Hind Quarters	1st	—		—		—		—		—	
Fore „	1st	—		—		—		—		—	
VEAL :—											
British	1st	112	0	112	0	112	0	112	0	112	0
	2nd	106	0	91	0	100	6	101	6	99	0
Foreign...	1st	—		—		—		—		—	
MUTTON :—											
Scotch	1st	121	6	121	6	121	6	121	6	121	6
	2nd	116	6	116	6	112	0	116	6	112	0
English...	1st	121	6	121	6	—		121	6	121	6
	2nd	116	6	116	6	–		116	6	112	0
Irish : Port Killed	1st	121	6	—		121	6	121	6	121	6
	2nd	116	6	—		112	0	116	6	111	0
Argentine Frozen	1st	107	6	107	6	107	6	107	6	107	6
New Zealand „	1st	—		—		—		87	6	–	
Australian „	1st	—		—		—		—		—	
LAMB :—											
British	1st	—		121	6	121	6	—		—	
	2nd	—		116	6	112	0	—		—	
New Zealand	1st	—		—		—		98	0	—	
Australian	1st	—		100	6	—		98	0	—	
Argentine	1st	107	6	107	6	107	6	107	6	107	6
PORK :—											
British	1st	133	0	—		133	0	133	0	—	
	2nd	—		–		116	6	—		—	
Frozen	1st	119	0	119	0	—		119	0	—	

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in November, 1917.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER:—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British...	—	—	—	—	27 3	—
	per cwt.	per cwt.	per cwt	per cwt.	per cwt.	per cwt.
Irish Creamery —Fresh	—	—	237 0	—	—	—
,, Factory... ...	—	—	233 0	—	—	—
Danish...	—	—	—	—	—	—
French...	—	—	—	—	261 0	252 0
Dutch	—	—	—	—	—	—
Australian	—	—	—	—	—	—
New Zealand... ...	231 6	—	—	—	227 0	224 0
Argentine	230 6	—	—	—	223 0	220 0
CHEESE:—						
British—						
Cheddar	150 0	148 0	—	—	151 0	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	159 6	—	161 6	—
			per cwt	per cwt.	per cwt.	per cwt.
Canadian	130 6	—	130 6	—	130 6	—
BACON:—						
Irish (Green)	177 6	—	—	—	173 0	—
Canadian (Green sides)	—	—	—	—	169 0	—
HAMS:—						
York (Dried or Smoked)	—	—	—	—	223 0	—
Irish (Dried or Smoked)	—	—	—	—	197 6	—
American (Green) (long cut)	151 0	—	146 0	—	153 0	—
EGGS:—	per 120.	per 120.	per 120.	per 120.	per 120	per 120
British...	—	—	—	—	41 8	39 2
Irish	34 10	—	32 10	31 3	34 9	32 3
Danish	—	—	—	—	34 9	32 6
American	27 1	—	26 4	25 4	25 9	25 0
POTATOES:—	per ton.	per ton.	per ton.	per ton	per ton.	per ton.
Edward VII.	155 0	146 0	131 6	126 6	147 0	138 0
Up-to-Date	152 0	142 6	148 0	142 6	145 0	135 0
Other late varieties ...	150 0	135 0	128 6	123 6	148 6	140 0
HAY:—						
Clover...	—	—	—	—	142 6	137 0
Meadow	—	—	—	—	142 6	137 0

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(*From the Returns of the Board of Agriculture and Fisheries.*)

DISEASE.	NOVEMBER.		ELEVEN MONTHS ENDED NOVEMBER.	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	25	44	388	486
Animals attacked	27	56	442	575
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	24
Glanders (including Farcy):—				
Outbreaks...	1	1	24	44
Animals attacked	3	1	49	112
Parasitic Mange:—				
Outbreaks	163	77	2,202	1,894
Animals attacked	258	121	4,131	4,186
Sheep-Scab —				
Outbreaks	27	44	447	247
Swine Fever:—				
Outbreaks'	97	235	1,985	3,999
Swine slaughtered as diseased or exposed to infection	19	128	837	9,017

IRELAND.

(*From the Returns of the Department of Agriculture and Technical Instruction for Ireland.*)

DISEASE.	NOVEMBER.		ELEVEN MONTHS ENDED NOVEMBER	
	1917.	1916.	1917.	1916.
Anthrax: -				
Outbreaks	—	—	3	3
Animals attacked ..	—	—	5	7
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	—
Parasitic Mange:—				
Outbreaks	—	1	41	59
Sheep-Scab:—				
Outbreaks	37	56	360	406
Swine Fever:				
Outbreaks	4	17	195	291
Swine slaughtered as diseased or exposed to infection	18	111	1,125	1,691

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of November, 1915, 1916, and 1917.

—	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
London ...	54	11	71	10	72	1	49	4	62	2	61	6	31	10	37	5	47	7
Norwich ...	52	7	68	3	70	6	48	3	57	11	60	3	30	7	37	0	41	10
Peterborough	53	3	69	1	69	8	49	3	59	7	60	0	30	11	36	9	41	0
Lincoln ...	53	7	68	8	70	4	48	4	59	9	60	3	30	6	37	5	42	4
Doncaster ...	52	11	67	2	70	0	44	11	57	3	58	9	30	9	35	4	41	0
Salisbury ...	52	3	71	4	69	9	48	5	60	4	60	3	31	3	36	8	41	7

ADDITIONS TO THE LIBRARY.

Agriculture, General and Miscellaneous—

Russell, E. J.—Manuring for Higher Crop Production. [2nd edition,] (94 pp.). Cambridge: University Press, 1917. 3*s*. 6*d*. net. [63.16(02).]

Hall, A. D.—The Book of the Rothamsted Experiments [2nd edition], revised by *E. J. Russell.* (332 pp) London: John Murray, 1917. [37(072).]

Bosworth, G. F.—Agriculture and the Land. (93 pp.) Cambridge: University Press, 1917. 1*s*. 6*d*. [63(022).]

Wibberley, T.—Farming on Factory Lines: Continuous Cropping for the Large Farmer (262 pp.) London: C. A Pearson, 1917. 5*s*. net. [63.3(02); 63.191.]

Roulston, O. W. H.—Soil Facts, or the Origin and Nature of Soils. (37 pp.) Dublin: Brunswick Press, 1917. 7*d*. net. [63.11(02)]

Field Crops—

Armstrong, S. F.—British Grasses and Their Employment in Agriculture. (199 pp.) Cambridge: University Press, 1917. 6*s*. net. [63.33.]

U.S. Department of Agriculture.—Farmers' Bull. 785:—Seed-Flax Production. (20 pp.) Washington, 1917. [63.34111.]

U.S. Department of Agriculture.—Farmers' Bull. 823:—Sugar-Beet Syrup. (13 pp) Washington, 1917. [664.1.]

Crookes, Sir W.—The Wheat Problem [3rd edition], with a chapter on Wheat Supplies, by *Sir R. Henry Rew.* (100 pp) London: Longmans, Green & Co., 1917. [63.311: 38.]

Goulding, E.—Cotton and other Vegetable Fibres: Their Production and Utilisation. (231 pp.) London: John Murray, 1917. 6*s*. net. [63.341.]

Horticulture—

U.S. Department of Agriculture—Farmers' Bull. 841:—Drying Fruits and Vegetables in the Home. (29 pp.) Washington, 1917. [664.8.]

U.S. Department of Agriculture—Farmers' Bull. 852:—Management of Common Storage Houses for Apples in the Pacific North-West (23 pp.) Washington, 1917. [634.1(*a*).]

Plant Diseases—

Bastin, H.—British Insects, and How to Know them. (129 pp.+XII. plates.) London: Methuen & Co., 1917. 1*s*. 6*d*. net. [59.57.]

U.S. Department of Agriculture.—Bull. 484:—Control of the Gipsy Moth by Forest Management (54 pp. + I. plate.) Washington, 1917. [63.27.]

U.S. Department of Agriculture.—Farmers' Bull. 799:—Carbon Disulphid as an Insecticide. (21 pp.) Washington, 1917. [63.294.]

U.S Department of Agriculture.—Farmers' Bull. 835:—How to Detect Outbreaks of Insects and Save the Grain Crops. (24 pp.) Washington, 1917. [63.27-31.]

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BREAKING UP GRASS LAND.

Area under Grass and Arable Land.—There are in England and Wales about 16 million acres of land permanently under grass, and 11 million acres of arable land. About 2½ million acres of the latter are temporarily under grass; so that at the end of 1916 there were more than 2 acres under grass for every acre of tillage land in England and Wales.

The Food Production programme for 1918 aims at ploughing about 2 million acres of the permanent grass and about half-a-million acres more than usual of the temporary grass.

REASONS FOR PLOUGHING GRASS LAND.

More Human Food can be Grown.—Land under the plough is much more productive than land under grass. It has been estimated that, cultivated as it was before the War, an average 100 acres of ploughed land in the United Kingdom provided subsistence for about 84 persons, while an average 100 acres of grass land provided for no more than 20. But these figures by no means show how much more valuable tillage land may be than grass to the nation at war.

Let us, therefore, compare the quantity of human food produced by grass and by certain of the tillage crops which might replace grass.

An acre of the finest grass land may in a good year produce from 1¾ to 2 cwt. of beef without the help of feeding stuffs; but the average for the country is far below this, and considerably less than one cwt. per acre is produced on the average by land of the quality now being ploughed up. If, however, it be assumed that one cwt. per acre may be secured, then it can be shown that the produce of 100 acres would provide subsistence for 14 persons for a year.* Adding the meat offals available as food, the number might be increased to 15 or 16.

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* Beef and the other foods mentioned would, of course, form part of a mixed diet, and would thus provide the meat, etc., required by a larger number of persons than here stated; thus in practice, the produce of 100 acres would provide one-seventh of the food of from 105 to 112 persons for a year. To simplify figures, the numbers maintained by each food, if regarded as the sole means of subsistence, have been given. A "person" is an average unit of the whole population; 3 full-grown men would require as much food as 4 "persons."

Land of a quality that would produce 112 lb. of beef per acre per annum without feeding stuffs should, under tillage, grow about 32 bush. of wheat, 36 bush. of barley, 48 bush. of oats or 6 tons of potatoes. Making allowances for seed and waste, assuming the grain to be milled as it is under war conditions, and using the milling offals and part of the straw for feeding cattle, the number of persons that could be fed from the produce of 100 acres for a year would be :—

Wheat	230	Barley	180
Oats	155	Potatoes	420

For a brief period during war it might be possible to grow corn or potatoes each year, but in ordinary circumstances a rotation including roots and clover would be called for. In this rotation part of the oat and clover crops would be required for working horses, and the food of the farm labourers would form a first charge on the human food produced. But so greatly does the food-producing capacity of arable land exceed that of grass, that, after farm labourers and horses have been provided for, the saleable products of a six-course rotation (wheat, roots, barley, clover, oats, potatoes), would provide subsistence for more than 150 persons per 100 acres, or ten times as many as could be maintained on the meat produced by 100 acres of grass.

It is obvious, therefore, that by converting grass into tillage land the difficulty of providing a subsistence diet in time of war is greatly lessened. But it will be argued that even in time of war meat and milk must be produced, and that by ploughing grass land we are reducing the quantities of these foods. It is admitted that a reduction in the area of grass land will involve some reduction of summer milk and summer beef in 1918, but we can afford this reduction if it enables us—as it does in the absence of imported feeding stuffs—to maintain the winter milk supply. It is not possible to deal with this subject here. It may be observed, however, that those who condemn the breaking up of pastures fail to recognise the fact that land under tillage is capable of producing much more meat, though not such cheap meat, as land under grass. Thus, for example, 100 acres of a 20-ton crop of mangolds converted into beef, under the conditions prevailing until last year, would provide for from 40 to 45 persons. In the absence of feeding stuffs the production will fall considerably, but in any case mangolds would be likely to yield twice as much meat as grass of medium quality. Again, if it were desired to convert half the potato crop into pork, 2½ tons of potatoes would yield about 2 cwt. of pork*; thus, after providing for seed and making allowance for reduced waste, 100 acres of potatoes grown after grass of medium quality would provide subsistence for 250 persons, viz. :—

Half crop used direct as human food ..	210
„ „ converted into pork	45

In other words, by replacing grass by potatoes it would be possible to provide meat for about 3 times, and in addition potatoes for about 15 times, as many persons as could have been maintained on the original grass-fed beef.

Direct Help can be Given to the Allied Armies.—Since the programme of tillage for 1918 was first drawn up, events have occurred which enable the farmers of Britain to make more direct contributions to our fighting strength than was possible a year ago. America has joined the Allies ; she is now raising large armies, and the number of men she can send to aid the Allies is limited only by the ships available for transport.

The extent to which the farmers of this country can aid may best be indicated by an illustration. The Department's programme aims at increasing the area under corn, potatoes and mangolds by about 3,000,000 acres as compared with 1916. In carrying out this programme, it is expected that in the spring of 1918 farmers will replace about 1½ million acres of grass by oats. If it be assumed that this newly-ploughed land yields on an average 36 bush. per acre, *plus* seed, the total quantity of oats produced would be approximately a million tons. It would require a fleet of three-hundred and sixty 5,000-ton steamships† to convey this quantity of corn from America to this country. If, on the other hand, the land remained in grass. it would not produce, at a liberal estimate, more than 75,000 tons of beef, and this quantity could be carried by fewer than forty 5,000-ton steamers. The labour expended by the agriculturists of England and Wales in breaking up and sowing with oats 1½ million acres of grass land in the spring of 1918 would thus enable this country to place at the disposal of the American Army a fleet of about 320 large steamships next winter.

METHODS OF BREAKING UP GRASS LAND.—About 300 farmers replied to the Schedule of Questions sent out by the Board last year, and from these replies a Report on Breaking-up Grass in 1917 was prepared.‡ The chief points may be summarized here.

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* To secure this return from potatoes in feeding growing pigs it would be necessary to include in the diet pig meal or separated milk.

† *i.e.*, Steamers with a carrying capacity of 5,000 tons of 40 cubic ft,

‡ Copies of this Report (Miscellaneous Publications, No. 19) may be obtained free and post free from the offices of the Board, 3, St, James's Square, S.W. 1. Letters of application need not be stamped.

Types of Land Ploughed.—Land of all qualities was broken up in 1917. In general terms it may be said that the better the land the better the result. On grass of good quality, much of which was ploughed, especially in the North of England, magnificent crops of oats were grown. Unfortunately the very wet harvest caused much damage to some of these fine crops, and potatoes proved more profitable than oats on the best of the land broken. Failures were most common on raw, cold clay soils, which were prepared with difficulty for the seed, and on the thinnest of the light soils where crops succumbed to drought in May—June.

When grass land is wanted for ploughing there is a very natural tendency to turn first to the heavy clay soils formerly under wheat ; or, in upland districts, to the thin soils formerly arable, which never grew much grass ; but under existing conditions, with both labour and manure scarce, it is a great mistake to expend either on soils of the poorest class. For food production good loamy soils of medium texture and at least 6 in. to 7 in. deep should be selected ; the turf should be fresh and healthy, with plenty of clover. The surface of the soil should neither be covered with a thick layer of half-rotted turf, which usually indicates sourness and excessive wet, nor should it be bare and exposed, as is often the case on heavy land, for this is generally an indication that the land is exhausted and unfit for corn growing until it has been drained and manured.

Crops Grown.—In most cases an oat crop was sown on newly-ploughed land ; either the ordinary white oat favoured in the district, or the Black Tartarian oat. Reports of successful results with the following crops were also received : Wheat (autumn and spring), barley, beans, peas, potatoes, mangolds, mustard, rape, turnips, linseed.

Cultivation.—The usual secret of success was thorough consolidation of the soil by pressing, or rolling with the Cambridge roller.

For the purpose of securing a satisfactory seed-bed, disc coulters and skim coulters on the plough are most useful attachments, as they enable the turf to be buried. On deep soil good results have been secured by letting two ploughs follow each other in the same furrow, the first turning a furrow of 2 to 4 in., the second a furrow of 6 to 8 in., thus burying the turf. An inverted (flat) furrow has usually proved to be most satisfactory, especially in late ploughing, for with this type of furrow there is less risk of leaving the soil "hollow." After ploughing, the land-presser, the wheel of a loaded cart, or the Cambridge roller should follow to press the land thoroughly. The harrow should follow along the furrow and should not cross until the turf has rotted, otherwise the furrows may be pulled back.

The disc harrow is most useful in securing a covering for the seed and in reducing rough furrows to a suitable seed-bed. Where seed is drilled. the disc drill is better than the common drill. With this implement a good covering for the seed may be secured in hard soils. After sowing, the roller should be used freely (loaded if the soil is dry). The harrow may also be used freely in most cases, but it is not, as a rule, desirable to work down new land into a very tilthy seed-bed for oats. There is some danger of disturbing the buried turf and loosening the soil.

Causes of Failure.—The chief cause of failure in 1917 was a loose, open soil. Where thorough rolling had not been resorted to the surface quickly dried up during May. A certain number of wireworms exist in most old grass land; frequently they are numerous, and in a soil which is not sufficiently rolled they do great injury and may even completely destroy the crop. The loose soil contributes to the destruction in two ways. Wireworms move about readily in open soils and attack many more plants than they do in land which has been thoroughly rolled. Further, in a compact soil. a plant is able to re-establish itself if the roots are partly cut by wireworms, whereas in an open dry soil the injured plant, even if it does not die off, produces little or no grain.

The wireworm attacks nearly all crops, but does much less damage to beans, peas, vetches, and linseed than to white straw crops.

The Frit Fly, common from Yorkshire southwards, is another frequent cause of failure in oats; in some districts it does more damage than the wireworm. Early-sown, and in some cases late-sown, crops are much less subject to attack than those sown between the middle of March and the middle of April. Tartarian oats are said to suffer less than ordinary oats.

Manures.—Cereal crops grown after grass of fairly good quality should not need manure, but where the land is poor, and the grass does not rot readily, sulphate of ammonia at the rate of ¾ cwt. to 1 cwt. per acre applied when sowing in spring will help the oat crop to withstand drought and insect attacks. Poor clay soils intended for wheat should get 2 to 3 cwt. of basic slag before sowing in autumn, and may also require ½ to 1 cwt. sulphate of ammonia in early spring.

NOTE.—This article is being issued in slightly different form as one of the series of Food Production Leaflets.

THE TESTING OF SEEDS FOR FARMERS AT THE OFFICIAL SEED TESTING STATION.*

I. Conditions Regulating the Sale of Agricultural Seeds.

THE attention of farmers is drawn to the fact that by the Testing of Seeds Order, 1917, recently made by the Food Controller, vendors of seeds are required to make a declaration in respect of the seeds they sell. The introduction of this Order is of the greatest significance to farmers, and it is important that they should make themselves acquainted with the conditions under which seeds are to be sold. It will in future be possible for them to compare the prices of the goods they are offered, and to ascertain whether the seeds they select are up to the declared standards.

The text of the Order was printed in the *Journal* for December, 1917, p. 1031.† (An article on the New Seed Testing Station and the Testing of Seeds Order appeared in the same issue, p. 937.) The following points may be specially noted :—

(1.) The Order does not relate to every kind of seed : the kinds included are given in the First Schedule to the Order (*see* p. 1076).

(2.) The Order applies to farmers in respect of seeds which they may grow and sell to other farmers. That is to say, for instance, a farmer growing red clover for seed must make a declaration in respect of the sample before selling the seed to another farmer. For cereals he is required to make a declaration as to variety but not as to germination and purity.

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* This article is being issued as Food Production Leaflet No. 18, copies of which may be obtained free on application by unstamped letter or post-card to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

† The Order is also printed as an Appendix to the Leaflet.

(3.) On the other hand, seeds sold wholesale and invoiced as "seeds as grown" are excluded from the provisions of the Order, so that no declaration is required from a farmer who sells "seeds as grown" to a merchant. as apart from retail sales to another farmer for sowing purposes.

(4.) In the case of vegetable seeds, no declaration is required before 1st July, 1918, unless specially asked for by the purchaser; but in the case of all other seeds mentioned in the Order, a declaration must be made in respect of sales on or after 1st January, 1918 No declaration need, however, be made in respect of sales not exceeding 2 lb. of pea and bean, and not exceeding 8 oz. of garden turnip, parsnip, onion. carrot, beet, garden cabbage, garden kale.

II. Establishment of an Official Seed Testing Station for England and Wales.

In connection with the above-mentioned Order, the Board of Agriculture have established a Seed Testing Station, and it is hoped that farmers will take advantage of the facilities offered by the station for having their seed tested, in order that the declarations made under the Order may be checked. and that the farmer may have the assurance that he is sowing reliable seed.

Regulations for the use of the Board's Seed Testing Station are given below. Unless these regulations are strictly complied with, delay in testing will ensue, or the samples may receive no attention.

(1.) **Kinds of Seeds to be Tested.**—The kinds of seeds that will be tested are those included in the Order (see p. 1076). In exceptional cases seeds other than these may be accepted for testing.

(2.) **Method of Sampling.**—Every endeavour must be made to secure a fair sample. It is not sufficient to take a sample from the top of a bag, but separate samples must be taken from the top, middle and near the bottom of the bag. If the seed is contained in more than one bag samples must be taken from each. All the samples thus taken should be well mixed together and a quantity of not less than the amount specified for the various species should be taken from the mixture.

(3.) **Size of Sample.**—The weights of samples sent to the station should not be less than those stipulated by Clause 7 (*b*) of the Order.

If smaller samples are forwarded a report on such samples will be sent for the guidance of the farmer; but a high degree of accuracy cannot be guaranteed in respect of such smaller samples.

When taking the sample the sender should draw a duplicate portion which should be retained for reference or for further tests if necessary.

(4.) **Despatch of Samples.**—Each kind of seed must be enclosed in a separate strong envelope and forwarded either separately or in a well-made-up parcel addressed to :—

The Director-General,
Food Production Department,
72, Victoria Street,
London, S.W. 1.

and marked in the top left-hand corner "*Seed Testing Station.*" Farmers can obtain suitable envelopes for the purpose, free of charge, on application to the Station.

A slip of paper must be enclosed in the envelope with each sample (suitable slips are provided with the envelopes supplied by the Station) giving the following particulars :—

(1) Name and full postal address (including county) of sender.
(2) Date when sent.
(3) Kind and variety of the seed
(4) Sender's reference number or mark if several samples of any one variety of seed are sent.
(5) The name and address of the person (or firm) from whom the seed was (or is) to be purchased.
(6) The price per lb. or per other measure.
(7) Copy of declaration as to purity, germination, etc., given by the seller.

If sent by letter-post, and properly addressed in accordance with the above instructions, the postage on the samples need not be paid, but if sent by parcels-post it must be paid.

(5.) **Fees to be Paid.**—A report on samples submitted will be furnished to *bonâ fide* English and Welsh farmers at the rate of 3*d.* per sample. **If this fee (three penny stamps) does not accompany the sample, no notice will be taken of it.** When the fees payable amount to 6*d.* or over, *i.e.*, where more than one sample is forwarded, the remittance must be made by Postal Order, which should be made payable to :—"Food Production Department."

(6.) **Reports on Samples.**—Samples will be dealt with at the Station in strict rotation as received.

It should be noted, however, that the testing of samples requires time, and farmers are therefore urged to send in their samples at the earliest possible moment.

The reports on samples will usually be furnished in about two weeks, except in the case of cocksfoot, crested dogstail, mangolds, parsnip, and onion, which may require from three to four weeks. Interim reports will, however, be furnished to farmers within a few days of the receipt of samples in cases where it is soon apparent that the seed is of decidedly inferior quality.

The report issued by the Station will include a statement as to the germination of the sample, the amount of impurity it contains, and the percentage of injurious weeds present. The chief weed seeds included in the sample will be named.

In the case of clovers the percentage of " hard seeds " will be given, and the presence or otherwise of seeds of dodder will be noted.

Additional " *remarks* " will be made as to the condition of the sample if it seems desirable in the interests of the farmer to do so. The report will not include a pronouncement as to whether the seed is true to name in respect of variety.

Seeds mixtures will not be tested as to the germination of the several species contained, but a report will be given as to the accuracy or otherwise of the declaration under which the mixtures were sold.

(7.) **General Remarks.**—When a farmer suspects that a parcel of seeds is not up to the standard given in a declaration he should exercise great care in taking his sample. The sample should be drawn in the manner laid down on p. 1071 in the presence of a reliable witness, or by an official sampler.

It should be realised that although a farmer may sometimes be able to obtain redress privately from a vendor of seeds on the basis of a sample drawn by himself without a witness, no legal action could be taken on the result of an analysis made on such a sample. In many cases, by the time a farmer has received a report on an informal sample sent to the Station he would have sown the seed, and it would be too late to have an official sample taken with a view to legal proceedings.

It cannot, therefore, be too strongly urged that farmers, both in their own interests and in the interests of national food production, should send samples of all seeds of doubtful quality to be tested some time *before they propose to sow them.*

III. Hints to Farmers as to the Purchase of Seeds.

It is at all times advisable to sow reliable seed. At present, however, in view of the shortage of food supplies, it is an absolute duty to refrain from using worthless seed.

The progressive farmer knows that it pays to use good seed. Briefly stated, the advantages of good seed over poor seed are that germination is quicker and more regular; the plants are stronger and more able to keep down natural weeds; weed seeds are not introduced; and the crop ripens more evenly.

"Good Seed" should, as well as having a satisfactory germination and purity, be of a variety known to succeed in the district where it will be sown, and at the time of the year when planted. This is particularly important in the case of cereals, especially Spring wheats (see Special Leaflet No. 49). In the case of many seeds, also, it is important that they should have been grown in a suitable country or district. This applies particularly to sainfoin, lucerne, and the red clovers.

The injurious weeds which the farmer should be chiefly on his guard against are: dodder, dock, sheep's sorrel, wild carrot, thistles, Yorkshire fog, and soft brome in clovers and grasses, and wild oat, wild onion, cleavers, field convolvulus, black bindweed and corn cockle in cereals; the latter also is common in imported vetches.

The varieties of grasses and clovers that usually contain the most injurious weeds (and in the largest amount) are:—

The rye-grasses (Yorkshire fog and soft brome).
The red clovers,
alsike clover,
and white clover. } Dodder, docks, wild carrot, sheep's sorrel.
Timothy (which may contain clover dodder).

Other weeds which are frequently contained in samples and which may often become troublesome, especially in certain soils, are:—

Ribgrass and wild geraniums (in clovers).
Bladder campion (in vetches and clovers).
Self heal (in alsike and white clover).
Field madder (in trefoil and clover).
Soft crepis (in crested dogstail).
Cat's ear (in rye-grasses).

Impure seed does most harm when introduced in seeds mixtures of grasses and clovers—the product of which may occupy the ground from 18 months to several years. Unfortunately it is the grasses and clovers which usually contain the greatest proportion of weed seeds.

Impure seed is also harmful when sown with cereals or vetches, crops which, although not occupying the ground for long, are difficult to keep weeded.

Impurity is, moreover, far more serious in the case of seeds sown in large amounts to the acre, than in those which are sown in small quantity only. Thus a very small proportion of injurious weed seeds in cereals, vetches, the rye-grasses and red clovers may none the less have a much greater fouling effect on the land than a higher percentage of impurity in, say, crested dogstail or meadow grass, or even in cocksfoot or timothy, usually sown in smaller amount per acre.

In this connection, and in order properly to appreciate the significance of the declarations made in respect of samples, it should be realised that even one per cent. of injurious weeds contained in a pound of any sample may mean a very large number of weed seeds per lb. The following figures are given as examples:—

1 per cent. of European clover dodder = about 18,000 seeds per lb.
,, ,, Sheep's sorrel = about 10,500 seeds per lb.
,, ,, Yorkshire Fog (in husk) = about 8,900 seeds per lb.
,, ,, Docks = about 3,200 seeds per lb.

It is even more important to sow pure seed on poor land than on good land, for on poor land the "seeds" do not "take" so quickly nor does the turf knit so closely together, thus the weeds have every chance of establishing themselves.

From what has been said above it should be obvious to the farmer that no trouble is too great to insure that his samples of rye-grasses, clovers, cereals and vetches in particular are to all intents and purposes free from injurious and land-fouling weeds. He must not, therefore, be misled by the declarations as to purity, but should satisfy himself that the amount of injurious weed is negligible.

Germination.—A very high germination is desirable, but if the sample contains injurious weeds, or is unsatisfactory in other respects, it should not be accepted on the score of its germination. Moreover, too much weight should not be attached to differences of 2 or 3 per cent. in the germination of a sample. Clovers and cereals, for instance, with a germination of 95 per cent. are just as likely to give a good "plant" as those with a germination of 100 per cent.

The danger in using seeds of a really low germination (below 60–70 per cent.) lies in the fact that many of the seeds are likely to be weaklings, and even if they germinate they cannot be depended upon to produce strong and healthy seedlings: so that a large increase in the seeding per acre of such samples cannot be relied upon to produce a "plant."

A poor germination is usually due either to the fact that (*a*) the sample consists largely or entirely of old seed, (*b*) the seed has matured under adverse conditions, or (*c*) it has been harvested in unfavourable weather.

Seeds which have matured or been harvested under adverse weather conditions, although sometimes showing a moderate germination capacity, frequently produce an unsatisfactory plant. Farmers should be particularly careful in the use of their own home-grown samples of cereals and red clover, and when it is known that these have been badly harvested. samples should be sent for a report from the Station before they are sown. In some cases it would suffice to add to the normal seeding per acre, and in others the samples should be rejected altogether for seed purposes.

Owing to the importance of securing maximum cereal crops, farmers are urged to take every precaution in the selection and use of their seed grain, and it is to be hoped that they will avail themselves of the facilities now offered them, and, when in any doubt as to the quality of their seeds, send samples to the Station to be tested *BEFORE* they *SOW* the seed.

First Schedule of the Order.

KIND OF SEEDS OF WHICH THE SALE AND EXPOSURE FOR SALE IS REGULATED.

Wheat, Barley, Oats and Rye.
Perennial Rye Grass.
Italian Rye Grass.
Cocksfoot.
Meadow Fescue.
Timothy.
Red Clover.
Alsike.
White Clover.
Crimson Clover.
Trefoil.
Lucerne.
Under whatever Trade name sold.
Sainfoin.
Crested Dogstail.
Tares or Vetches.

Pea.
Bean.
Mangold.
Swede.
Rape.
Parsnip.
Onion.
Carrot.
Beet.
Turnip (Field).
Turnip (Garden).
Cabbage (Field).
Cabbage (Garden).
Kale (Field).
Kale (Garden).

TRIALS ON GRASS LAND WITH OPEN-HEARTH BASIC SLAG AND ROCK PHOSPHATES.

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AT the present time there is a very large demand for phosphates as a manure for both arable and grass land. Partly on this account and partly for various other obvious reasons the prices of the various phosphatic fertilisers have steadily increased during the past few years. Further, it is no exaggeration to say that with the judicious use of suitable phosphates the productive capabilities of the grass land in this country could be doubled. For these reasons, therefore, the effective use of all available sources of phosphoric acid, particularly those existing in this country, is of great importance at the present time, and is likely to be of still greater importance in the near future.

Several hundred thousand tons of open-hearth basic slag or fluorspar slag are produced annually in this country, and little or no agricultural use has been made of this material in the past. In a paper read to the Society of Chemical Industry by Professors Gilchrist and Louis,* the writers estimate the annual production of these slags at 750,000 tons. The projected increase in the iron and steel industry will augment this amount considerably, and it is therefore a matter of importance to determine whether or not these waste slags have any appreciable agricultural value. In the past large quantities of these low-grade slags have been used for road-making purposes, while considerable expense has been incurred in disposing of surplus supplies.

In the manufacture of steel by the basic open-hearth process, it is necessary to add large quantities of lime in order to remove undesirable impurities, such as sulphur and phosphorus. The slag so formed is not easily fusible, and in order to overcome the difficulty fluorspar (calcium fluoride) is added to the furnace. The amount of fluorspar to be added is left entirely to the skilled man in charge of the operation, and it may be added at several stages of the process.

In the past only some of the firms following the basic open-hearth process used fluorspar in the furnace, but within the last few years the use of fluorspar has greatly increased, and it is probable that in the future it will be used in all the basic open-hearth processes.

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* *Journal of the Society of Chemical Industry*, Vol. 36, p. 261.

Basic open-hearth slag or fluorspar slag differs from ordinary basic slag in having a much lower solubility according to the citric acid test.* In ordinary basic slag 75 to 100 per cent. of the phosphate is soluble in 2 per cent. citric acid, whereas the phosphate in fluorspar basic slag has a citric solubility of from 20 to 50 per cent.

In normal times this low solubility has seriously militated against the use of fluorspar slag. In the final issues, however, the value of any particular manure, whatever laboratory tests may indicate, must ultimately be determined by the results obtained from extensive field trials on a farming scale.

Professor Gilchrist's tests on three-years ley†—three series in all—show in a very striking manner the value of low citric-soluble phosphates. As the result of his trials Professor Gilchrist comes to the following conclusion concerning the citric solubility of basic slag :

" In one case out of five, slag with high citric solubility has given the best results, and in two cases the worst. In one out of two cases the slag with *low* citric solubility has given the best results. The medium citric soluble slags gave the best results in one case out of two.

" The balance of results does not indicate that a high citric solubility gives either quicker or better results. The popular belief that a high citric soluble slag means a quicker acting slag is not confirmed by these results." Concerning mineral or rock phosphates, the following conclusions are drawn. " These deserve more attention from the experimenter and the farmer . . . . Both Tunisian phosphate and Belgian phosphate have given quite satisfactory results, and the latter especially so when it has been calcined."

In order to compare the relative values of low and high citric-soluble phosphates, and with the object of discovering whether Professor Gilchrist's results at Cockle Park were applicable to Essex soils, the writer in 1915 commenced three series of experiments on meadow hay in Essex with low and high citric-soluble phosphates. Three types of soil were selected :—(1) Boulder Clay, (2) London Clay, and (3) Chalky Boulder Clay. The analyses of the slags used are given in the following table :—

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* To perform this test 5 grammes of the phosphate are placed in a litre flask containing 500 c.c. of 2 per cent. citric acid solution. The flask is shaken end over end for 30 minutes in an apparatus making 30 revolutions per minute.

† Guide to Cockle Park, 1915, pp. 39 to 41.

TABLE I.

	Basic Slag. Plot 1.	Gafsa Phosphate. Plot 2.	Fluorspar Slag. Plot 4	Basic Slag. Plot 5.	Basic Slag. Plot 6.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Phosphate ($Ca_3P_2O_8$) ..	38·94	57·22	27·07	25·10	21·15
Phosphoric acid (P_2O_5)	17·84	26·21	12·40	11·50	9·69
Calcium oxide (Lime) ..	48·82	—	42·40	45·28	46·50
Citric soluble phosphate ($Ca_3P_2O_8$)	35·80	21·94	12·40	23·47	17·44
Citric soluble phosphoric acid (P_2O_5)	16·40	10·05	5·68	10·75	7·99
Citric solubility	92·0	38·3	45·0	93·4	82·25

Centre 1 : Boulder Clay, Stapleford Abbots.—Ten plots, each one-fifth of an acre, were marked off on a poor meadow, which was known to respond to phosphatic manures. The meadow was known to have received no manurial treatment during the past 30 years. The pasture was exceedingly coarse and there was practically no clover showing.

Plots 1, 2, 4, 5 and 6 received dressings of various phosphates at the rate of 200 lb. of phosphoric acid per acre—roughly equivalent to a dressing of 10 cwt. per acre of high-grade basic slag.

Plots 8, 9, and 10 received the same manures as plots 2, 5 and 4, but only half the dressing, namely, 100 lb. of phosphoric acid per acre.

The hay was weighed when ready for stacking and carted to the stack immediately after weighing. The manures were sown, and the hay crops weighed, under the personal supervision of the writer. The whole of the hay on each plot was weighed, and every precaution was taken to ensure the accuracy of the results which are given in Table II. (p. 1075).

It is evident from the above results that all the phosphates gave a profitable return. In every case the increase in the first year was more than sufficient to pay for the total cost of the manurial dressing, which it is estimated is sufficient for 6 years. .

Gafsa rock phosphate and fluorspar slag, apart from what the citric acid test may indicate, are an economical success for meadow hay on this type of soil.

Summary of Farmer's Observations.—1916, 31*st May.*—Little to choose between 1 and 2, and thinks plot 2 has got quite as good a bottom of clover as plot 1. Plots 4 and 5 are very good, but prefers plot 4; plot 6 not so good as plots 4 and 5. The 100 lb. dressing appears to be quite as good as the 200 lb. dressing.

TABLE II.—*Boulder Clay, Stapleford Abbots.*

Plot No.	Manure.	Citric Solubility of the Phosphate.	Hay: Cwt. per acre.		
			1916.	1917.	Average 2 years.
	200 *lb.* P_2O_5 *per acre.*	Per cent.			
1	Basic Slag (high grade)	92·0	45·5	28·2	36·8
2	Gafsa rock phosphate	38·3	37·1	30·0	33·6
3	No manure	—	31·6	20·4	26·0
4	Fluorspar slag	45·0	47·3	33·5	40·4
5	High-soluble basic slag (low grade)	93·4	46·9	33·9	40·4
6	High-soluble basic slag (low grade)	82·2	40·1	35·9	38·0
7	No manure	—	34·6	22·2	28·4
	100 *lb.* P_2O_5 *per acre.*				
8	Gafsa rock phosphate	38·3	42·6	33·2	37·9
9	High-soluble slag as for plot 5	93·4	45·2	29·8	37·5
10	Fluorspar slag	45·0	50·8	31·2	41·0
			Per cent.	Per cent.	Per cent.
	Average gain of plots 1, 2, 4, 5 and 6 over plot 3		37·4	57·8	46·2
	Average gain of plots 8, 9 and 10 over plot 7		33·5	41·4	36·6

1917, 16*th June.*—There is nothing to choose between plots 1 and 2. The difference between the manured and unmanured plots is very striking. Plot 4 seems to have a slight advantage over plot 5. Plot 6 is improving rapidly and looks like being the best plot. Plots 8, 9 and 10, receiving half dressings, do not show so well as plots 1, 2, 4, 5 and 6.

In general it may be said that other visitors to the plots were in agreement with the observations noted above.

Centre 2: London Clay, Latchingdon.—The plots at this centre were one-quarter of an acre in area, and the treatment was exactly the same as that adopted for centre 1. (Table III.)

Summary of Farmer's Observations.—1916, *30th May.*—Plot 1 was best, closely followed by plot 4. Plot 2 did not look as if it would weigh out as heavily as plot 1. The predominating clover on plot 2 was yellow suckling clover, whereas on the other manured plots wild white clover predominated. Plot 4 was much superior to plots 5 and 6. All plots showed a very marked improvement over plot 3.

TABLE III

Plot No.	Manure	Citric Solubility of the Phosphate.	Hay: Cwt. per acre.		
			1916	1917	Average 2 years
	200 lb. of phosphoric acid per acre	Per cent			
1	Basic slag (high grade) ..	92·0	44·4	24·3	34·3
2	Gafsa rock phosphate ..	38·3	44·2	19·1	31·6
3	No manure	—	31·4	14·5	23·0
4	Fluorspar slag	45·0	44·7	23·5	34·1
5	High-soluble slag (low grade)	93·4	37·6	21·9	29·6
6	High-soluble slag (low grade)	82·2	40·9	22·7	31·8
			Per cent	Per cent.	Per cent.
Average increase of manured plots over plot 3			34·4	53·8	40·4

1917, *June.*—Plot 1 again the best, its superiority over plot 2 being quite noticeable. Plot 6 was showing very well and making rapid progress. There was little to choose between plots 4 and 6; both, however, were superior to plot 5. The yellow suckling clover so pronounced on plot 2 the previous year had given place to wild white clover, which, however, was not so vigorous as on plots 1 or 4.

Centre 3: Chalky Boulder Clay, Wenden, Saffron Walden.—The conditions of the experiment were precisely the same as for the other two centres. It is worthy of note, however, that the soil is much superior to that of the other two centres. The plots were one-quarter of an acre in area. (See Table IV.)

Writer's Observations.—1916, 31*st May.*—All the manured plots showing well. Plot 1 looked the best. Plots 4 and 2 were much superior to plot 5. Plots 2, 4 and 6 looked equally well.

Farmer's Observations.—1917, 16*th June.*—Very pleased with the appearance of the plots, particularly with the contrast afforded by plot 3. As far as plots 1, 2, 4, 5 and 6 were concerned, he could not say which was the best.

Notes.—The experiments are by no means complete, as it is intended to let them run for at least six years. It is too soon to say definitely that the low citric-soluble phosphates are as good as the high citric-soluble phosphates. This much, however, can be said. If the low citric-soluble phosphates give no further returns, which is most unlikely, during the next few years, they will nevertheless have paid handsomely.

TABLE IV.

Plot No	Manure	Citric Solubility of the Phosphate.	Hay : Cwt. per acre. 1916	Hay : Cwt. per acre. 1917.	Hay : Cwt. per acre. Average 2 years.
	200 lb of phosphoric acid per acre	Per cent			
1	Basic slag (high grade) ..	92·0	68·5	30·4	48·4
2	Gafsa rock phosphate ..	38·3	62·8	31·5	46·6
3	No manure	—	51·2	25·4	38·3
4	Fluorspar slag	45·0	64·9	35·1	50·0
5	High-soluble basic slag (low grade)	93·4	54·8	34·4	44·6
6	High-soluble basic slag (low grade)	82·2	60·3	40·4	50·3
			Per cent	Per cent.	Per cent.
	Average gain of manured plots over unmanured		21·6	36·0	25·1

The results may be best studied by collecting and averaging the returns from each particular manure for the three series, and representing the increase as a percentage increase over the average return from the unmanured plots. The following table contrasts the value of the various phosphates by this method :—

TABLE V.

Plot No.	Manure.	Citric Solubility of the Phosphate.	Average Percentage Increase at 3 Centres over Average of Unmanured Plots.		
			1916.	1917.	Average Percentage Increase for 2 years.
		Per cent.			
1	High-grade basic slag ..	92·0	38·3	37·3	36·8
2	Gafsa rock phosphate ..	38·3	26·3	33·8	28·2
3	No manure	—	—	—	—
4	Fluorspar slag	45·0	37·6	52·7	42·6
5	Low-grade high-soluble basic slag	93·4	22·1	49·2	31·3
6	Low-grade high-soluble basic slag	82·2	24·0	64·9	37·4

On each of the three centres the basic open-hearth or fluorspar slag used (plot 4) has given exceedingly satisfactory results, and it is reasonable to expect under similar conditions equally good results from slags of this description. It should, however, be pointed out that fluorspar slags of a much lower citric solubility than that tried in these experiments exist. At the time these trials were laid down it was not found possible to secure a slag with a lower citric solubility than 45 per cent. Since then, however, the writer has been able to lay down nine further series of experiments in Essex, using a large number of rock phosphates, and a basic slag whose phosphate content is only 20 per cent. citric soluble. Only one year's results are as yet available, and it would obviously be unfair to lay stress on them at the present time. As far as they go the results confirm those which have already been detailed. At only one centre does the high citric-soluble slag give appreciably superior results to the low citric-soluble phosphate. On this centre the low citric-soluble slag has increased the crop by 64 per cent.

The results obtained with Gafsa rock phosphate are also very encouraging. Only 38 per cent. of the phosphate in this material is citric soluble, yet the results are only slightly inferior to those obtained by the application of high-grade basic slag. At the present moment, however, rock or mineral phosphates are of secondary importance to fluorspar slag, because they have to be imported from abroad, whereas fluorspar slag is obtained, as a by-product, in this country.

The phosphate content of open-hearth or fluorspar basic slags varies considerably. A proportion of these slags contain only from 10 to 14 per cent. of phosphate, but a large proportion contain from 18 to 27 per cent. of phosphate. It is, of course, doubtful whether the lowest grades have any commercial possibility, but those containing from 18 to 27 per cent. of phosphate are likely to prove particularly valuable at the present time.

A much greater production of cereal crops is an object of urgent necessity, and one which is being achieved by bringing under cultivation large areas of pasture land. It is obvious that, if we are in the future to maintain our head of live stock at the former high level, our remaining pasture land should be made to produce much more than in the past. There are hundreds of thousands of acres of poor pasture on heavy clay soil in this country. If agricultural science has demonstrated one thing more than another it is that with the judicious application of basic slag the returns from our grass land can be much increased. The writer would, therefore, suggest that, as far as possible, this new open-hearth basic slag should be utilised for improving the poor pasture and meadow hay land, and the normal high citric-soluble slag reserved for cereal crops. This course is suggested for two reasons :—

(*a*) Because it has been shown, both in Essex and elsewhere,* that open-hearth basic slags are capable of giving excellent and profitable results on poor heavy clay pasture land.

(*b*) Because as such slags have only recently been placed on the agricultural market no reliable data are as yet forthcoming as to their effect on cereal crops.

To obtain the best results from open-hearth basic slag and rock phosphates two conditions are necessary :—

1. *Fine Grinding.*—This point cannot be too often emphasised, and much more importance should be attached to it than at present. It is usual to be content with a "fineness of grinding of 80 per cent.," that is to say, such a fineness that 80 per cent. of the slag will pass a sieve with 10,000 meshes to the square inch. A greater fineness of grinding is desirable and can be obtained. Portland cement is ground so that 95 per cent. passes a sieve with 32,400 meshes to the square inch, and there is no reason why that standard should not be obtained for basic slag. So long, however, as a fineness of

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* See Professor Gilchrist's Guide to Cockle Park, 1917.

80 to 90 per cent. through a sieve with 10,000 meshes to the square inch will satisfy the farmer and the agricultural chemist there is little chance of the middle-man who grinds the slag bestirring himself.

2. *Early Application.*—It is quite possible that open-hearth basic slag and rock phosphates may be slower in their action than the normal high-soluble basic slags. To obviate this possible disadvantage early application is very desirable. Whenever possible, open-hearth basic slag should be applied in the early autumn. If it is applied in the late winter or early spring it may show little return during the year of application. None of its value would be lost, however, and the full benefit would be derived in succeeding years.

The rate of application is an important point, particularly when the slag is being applied with the object of improving poor meadow land. A heavy dressing is desirable and should, whenever possible, be given. The dressing which has been found most economical in Northumberland and Durham, in Essex and elsewhere, is one which is equivalent to 200 lb. of phosphoric acid per acre. In the following table the quantity equivalent to 200 lb. of phosphoric acid per acre for various quality slags is given.

TABLE VI.

Quality of Slag.	*Dressing Equivalent to 200 lb. of Phosphoric Acid per acre. Cwt per acre.*
Total Phosphate 40 per cent.	9·8
,, ,, 30 ,, ,, ...	13·1
,, ,, 28 ,, ,, ...	14·0
,, ,, 26 ,, ,, ...	15·1
,, ,, 24 ,, ,, ...	16·3
,, ,, 22 ,, ,, ...	17·8
,, ,, 20 ,, ,, ...	19·6
,, ,, 18 ,, ,, ...	21·8

Such applications may be expected to effect marked improvement and will be quite sufficient for five or six years. At the end of this time the improvement in the pasture may be maintained by applying either half the above dressing every third year, or the whole dressing every sixth year.

Open-hearth basic slag should come on the market under a new name such as "fluorspar slag," and at a rate cheap enough to tempt the farmer to buy. As its undoubted merits become recognised the law of supply and demand will quickly give open-hearth or fluorspar basic slag and rock phosphates their fair place in the manure price lists.

The writer wishes to acknowledge his indebtedness to Mr. R. M. Wilson, B.Sc., for many helpful suggestions, and to Mr. R. Robson, M.Sc., for his invaluable and ungrudging assistance in the control of the field experiments recorded in this paper. Thanks are also due to Mr. N. F. Miles, Mr. A. Perry, and Mr. B. Smith, on whose farms the field experiments were conducted, for their practical sympathy and for the care and trouble they took to make the experiments a success.

CHEESE MITES.

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A GREAT deal of damage to cheeses in this country is caused by cheese mites. All old cheeses are liable to be attacked by them, but the unpressed, ungreased cheeses, such as Stiltons and Wensleydales, usually suffer most. The trouble is first apparent about two weeks after the new Stiltons have been placed in the cheese room to ripen, though careful examination shows that it may begin much earlier than this by infection from hoops and other utensils used in the making of the cheeses, owing to imperfect cleansing of these articles.

The mites are so small that they are almost invisible to the naked eye, but their presence can be detected by means of a hand lens. As soon as they begin to multiply on the cheeses their excreta and dead bodies form a characteristic dust of a yellow colour and unpleasant odour. Unless checked, the mites increase with incredible rapidity and eat large holes in the cheeses, working beneath blisters in the crust of Stiltons and under the bandage of Wensleydales. Sometimes a large piece of the cheese will break off and the remainder becomes dry, hard and cracked. The result is a serious depreciation both in appearance and in value, and in bad cases nearly one-half of the cheese may be eaten away. According to statistics obtained by Dr. Williams,* about 100,000 Stiltons (the cheeses most affected) are made annually in this country. These cheeses weigh on the average, when ripe, about 14 lb., and before the War sold at the rate of 1*s*. per lb. Estimating the average loss due to cheese mites at 2½ per cent. of the whole cheese (a not very excessive estimate) and the labour involved in attending to the cheeses at 4*d*. per week for each 100 cheeses for a period of 26 weeks, we obtain the following figures :—

Value of 100,000 cheeses each weighing 14 lb. at 1*s*. per lb.	£70,000
Loss due to cheese mites 2½ per cent.	£1,750
Labour 4*d*. per week for each 100 cheeses for 26 weeks (approx.)	£433
Total loss	£2,183

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* Further information on the subject of damage due to Cheese Mites is desired by Dr. Williams, and should be addressed to him at the Dairy Research Department, University College, Reading.

Systematic Position.—Mites are allied to spiders and ticks. In these forms the body is incompletely divided into two (the cephalo-thorax and the abdomen); the adult possesses four pairs of legs, and the mouth parts are formed for biting, piercing or sucking. All mites are exceedingly small, yet they are capable of causing enormous damage. Many are parasitic on animals, like the Itch and Scab mites, some cause the formation of plant galls, while others, like the Cheese mites, feed on food substances, and some species are carnivorous and beneficial. The great damage that mites can do is dependent on five factors:

1. The mites multiply with extraordinary rapidity. It has been estimated that a pair of Itch mites can, under favourable circumstances, produce one-and-a-half million progeny in three months.
2. The life cycle is completed in a few weeks, so that a new egg-laying generation is produced at frequent intervals.
3. Mites can crawl through very small crevices, and, as will be seen later, they are carried about by other animals to infect new hosts or new food material.
4. The mites can live for long periods—often many months—without food, and can endure heat, cold and drought.
5. The mites can adapt themselves, in the case of the food mites, to a variety of food substances. Cheese mites, for example, will thrive equally well on flour, stored grain, dried fruits and drugs, hay, etc., especially if these are allowed to get damp. It is said that few households are without them, but it is rarely that they become a pest in a house, because food is not usually stored long enough for them to multiply.

Species.—Four species attack cheese. All of these are to be found on old Cheddars and three species on Stiltons and Wensleydales. Old cheeses of any kind, however, are liable to attack. The four species are:—

1. *Carpoglyphus anonymus*, the Cheddar Mite.
2. *Tyroglyphus siro*, Stilton and Cheddar Mite.
3. *Tyroglyphus longior*, ,, ,, ,,
4. *Aleurobius farinæ*, ,, ,, ,,

The specific characters need not be entered into here, since the life history of the four species is the same, with the exception of a special carrying stage in *Tyroglyphus longior*. (See below.)

Life History.—There are four stages in the life-history—the egg, larva, nymph, and adult male or female. From egg to adult stage occupies about four or five weeks, as ascertained by observing mites kept in small glass cells.* It is possible, however, that under these artificial conditions the developmental period is lengthened.

The egg is a white oval body, so small as to be only just visible to the naked eye. It possesses a wrinkled coat which is extremely resistant to external conditions, so that it is very difficult to kill the egg. From the egg hatches in about ten or twelve days a minute colourless larva of glassy appearance and with only three pairs of legs. The larva feeds for about a week, then becomes quiescent and casts its skin, emerging as the first nymph. The first nymph is larger than the larva and has four pairs of legs. It moults again and becomes the second nymph, which differs from the first nymph in that its legs have developed the hard brown chitinous covering so characteristic of the adult. After the third moult the mite emerges as the adult male or female, and its sexual organs become functional for the first time.

In *Tyroglyphus longior*, however, there is an additional stage after the first nymph stage, which is specially adapted for distributing the species. This stage is known as the Hypopus stage and occurs under favourable conditions, that is. when the mites are allowed to breed unchecked. The Hypopus (Fig. 4) is like a minute tortoise. It is extremely small, pinkish in colour, and has a hard shelly back of chitin. The legs are short, the mouth parts rudimentary, and there is no evidence that it feeds. On its ventral surface it has a sucker plate by means of which it attaches itself to other mites, to flies and moths which alight on the cheeses, or even to the skin and clothes of human beings. It is thus carried about until it finds a suitable place, when it drops off, moults to become a second nymph, and commences feeding.

The adult (Figs. 1, 2, and 3) is of a cream or yellowish colour, but varies with the nature of its food. It possesses four pairs of jointed legs and can run rapidly, and for considerable distances. Its mouth parts, which consist of two pairs, are admirably formed for cutting off and chewing up small pieces of its food material. There are no eyes,* though the mite can distinguish between light and darkness, and its habit is to shun the light. The body is covered with sparse hairs, whose length and arrangement vary with the species. The legs are more highly chitinised than the remainder of the body. In *Tyroglyphus longior* they are pinkish, in *Aleurobius farinæ* a rich chocolate brown. Each consists of five joints, and bears on the penultimate joint a long tactile hair by means of which the mite feels its way about. On the under side of the body are the anus and reproductive apertures. Mites possess no breathing organs, but breathe through the skin, and it is, therefore, very difficult to kill them by fumigation.

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* These cells were made, as suggested by Michael in his "British Tyroglyphidæ," Vol. 1., p. 135, by fixing a glass ring about one-eighth of an inch in height to a slide. Moist blotting paper was put in the base of the cell, and the rim was smeared with vaseline and covered with a glass slip. One or more mites were put into the cell along with a small piece of cheese as their food, and the cells were examined from day to day.

Experiments and Observations.—1. *To ascertain how new Cheeses become infected in a Cheese Room previously attacked.*—Stiltons are usually made from April to September, and are then cleared out of the dairies by December. From December till the end of April, that is to say, till the next Stilton season, the Stilton room is usually empty or is used for other cheeses which are not attacked by mites unless very old. From such a cheese room, which had been used since Christmas only for cheeses that are not usually attacked, scrapings from corners, window ledges and shelves were taken in June. In each case, amongst a mass of dust and dead bodies of mites, a few live mites were found. The new Stiltons were placed on the shelves at the end of June and in a fortnight's time showed numbers of mites on the coat. The mites that attacked the new Stiltons, therefore, were already present in the cheese room. The ordinary cleansing methods had failed to kill them, yet the greatest care is taken in this dairy to keep the place thoroughly clean. Eggs were never seen in the scrapings ; all the individuals were adults, and it appears probable that the interval between the Stilton periods is tided over by adults.

2. *To ascertain how Mites spread from Cheese to Cheese and from Shelf to Shelf.*—It is obvious that on emerging from their retreats they will crawl to the nearest cheeses, but this does not entirely explain how they pass from one shelf to another. Two experiments were carried out in order to ascertain this. In both these experiments the crawling of the mites to the cheese was prevented by a band of grease in the one case and by a water bath in the other.

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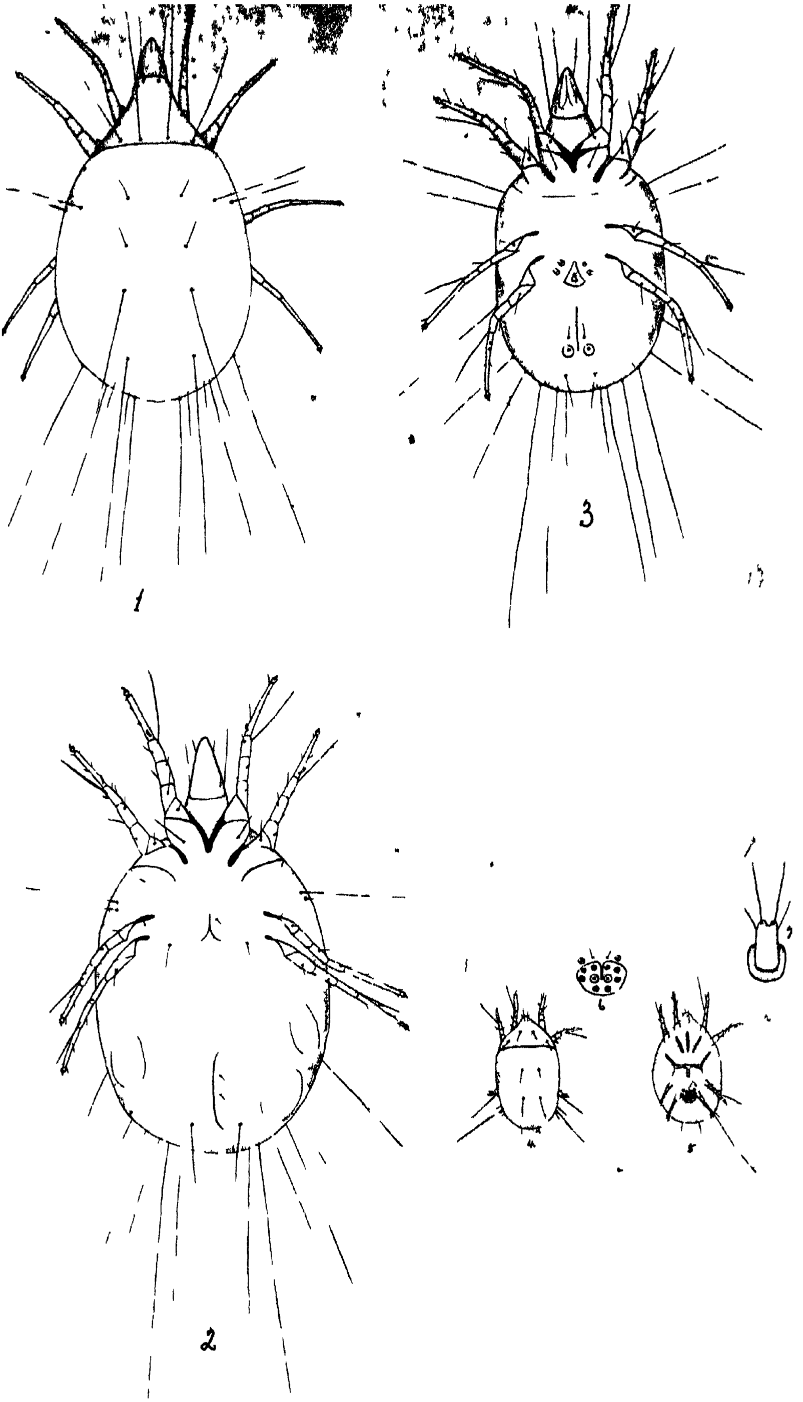
* *Carpoglyphus* has "eye-like organs," but these have no pigment, and it is doubtful if this mite can see.



CHEESE MITES

FIG 1—*Tyroglyphus longior*, Dorsal view, × 78 FIG 2—*Tyroglyphus longior*, Female, Ventra view, × 78 FIG 3—*Tyroglyphus longior*, Male, Ventral view, × 78 FIG 4—*Tyroglyphu longior*, Hypopus stage, Dorsal view, × 78 FIG 5—*Tyroglyphus longior*, Hypopus stage Ventral view, × 78 FIG 6—Sucker Plate of Hypopus FIG 7—Rostrum of Hypopus

Experiment 1.—A trestle stool, which had never been used in the cheese room, was thoroughly scrubbed and placed in the centre of the Stilton room. The legs were thickly smeared with vaseline about 6 in. from the floor. Any mites, therefore, that attempted to crawl up from the floor would be caught by the grease band. A sheet of plate glass was placed on the trestle and on it four new Stiltons. These cheeses were turned each day by the same student, who did not touch any of the mite-attacked cheeses, so that it was improbable that she could carry mites to these four cheeses. Since the mites could not crawl on to the cheeses, and these were nevertheless attacked about two weeks later than the other Stiltons in the room, there were three possibilities :

(1) That the mites could be carried by flies, which were observed crawling over the cheeses.

(2) That the mites, being so small, could be blown by a draught across the small space between shelves and trestle.

(3) That the person who turned the cheeses, in spite of the care taken, may have carried the mites.

A fly-paper was hung up in the room and the flies caught on it were examined under the microscope. Mites in small numbers were found attached to their legs, so that there seems to be no doubt that mites can be carried in this way. In fact, the Hypopus stage (see life history above) is specially adapted for conveyance by this means. If the mites can be carried short distances by flies, there is every possibility that new cheese rooms become infested by mites carried by flies, moths and other insects which have previously visited places where these small creatures abound.

Experiment 2.—The trestle in this case was not grease banded, but on it was placed a large bath containing water to a depth of about 2 in. It had been previously ascertained that mites could not traverse a piece of water, so that any mites that crawled up the legs of the trestle and over the edge of the bath would fail to reach the cheeses, which were placed on boards elevated above the water. These cheeses were attacked by mites at about the same time as those in Experiment 1, that is to say, about two weeks later than those that were put on the shelves, and presumably from the same causes, for moths and flies were seen on these cheeses also.

Of the three possibilities mentioned above, therefore, the first becomes a fact, viz., that flies and moths can carry the mites. No experiment has yet been made to show whether the mites can be blown through the air, though it is highly probable that this is the case, at any rate for short distances. The possibility of the person who turned the cheeses conveying mites must not be overlooked, though every care was taken to prevent it. Anyone who has turned mite-eaten cheeses, however, will realise that human beings can carry mites from one place to another, and will have experienced the tingling and itching sensation due to the presence of the mites on the skin.

3. *To ascertain the Effect of Natural Conditions on Mite Attack.*—(*a*) *Light and Darkness.*—Mites prefer darkness to light, and if exposed to light disappear after a short time, hiding under anything that will shade them. The darker the cheese room, therefore, the worse the mite attack is likely to be.

Cheese rooms are often partly or entirely underground, and while this is an advantage from the point of view of temperature, it is at the same time a disadvantage because it makes the conditions favourable for mites.

(*b*) *Temperature and Humidity.*—The temperature of the cheese rooms, which is usually between 50 deg. Fah. and 60 deg. Fah., is most favourable to the rapid breeding of mites, probably because they have adapted themselves to that range of temperature. Much lower temperatures, however, do not kill them unless the humidity of the atmosphere is considerably lessened. Experiments show that moisture in the air is not only favourable to mites, but essential to them. Breeding cells, for example, must be kept moist with damp blotting paper, or the inhabitants die in a very short time. It is possible to raise the temperature of a vessel containing mites to 35 deg. Cent. (95 deg. Fah.) without killing the mites, as long as moisture is present, but if they are put into a dry vessel and raised to the same temperature they invariably die. At ordinary temperatures they thrive best during mild damp weather, and this seems to be borne out by a comparison of the temperature charts kept in the cheese room at the University College, Reading. A good year as regards the prevalence of mites is one with a fairly constant low humidity, whereas a bad year shows a very damp period, especially in August and September.

The common practice of dipping mite-attacked cheeses in hot water or of submitting them to steam-heat is, therefore, of no use as a remedy, for the mites withstand the increased temperature easily, and since the treatment makes the surface of the cheese wetter than before, the mites tend to breed more rapidly as a result. At most some of the mites are removed from the coat of the cheese, and this could have been effected just as well by brushing.

4. *To find some Substance that will exterminate the Mites on an attacked Cheese.*—The difficulties of finding such a substance are two-fold. In the first place the mites themselves are so small and so prolific, and they can live in an atmosphere whose oxygen content is so much diminished, that very few substances will kill them. Secondly, the number of substances available is limited, because nothing must be used that will either leave a taste or smell on the cheese or will affect its ripening. If a liquid be used, therefore, it must be a volatile one, so that it leaves no trace behind it, and does not make the cheese wet and sticky. On the other hand, if fumigation be resorted to, the

fumigant must be of so powerful a nature that it can get through the cuticle of the mites, since they possess no breathing organs.

Experiments were first made on a small scale by putting a quantity of mite dust in glass gas jars and subjecting the dust to treatment by the various well-known acaricides or mite-destroying compounds, most of which contain sulphur. Sulphuretted hydrogen gas, sulphur di-oxide and carbon bisulphide were the chief fumigants used in this way, and on a small scale all these gases killed the mites, but when the first two were employed on a larger scale by fumigation of a small room containing a few cheeses, it was found that so many mites managed to survive that the treatment may be regarded as ineffective. This was not the case, however, with the carbon bisulphide, which killed most of the mites, but did not affect those that were on the bases of the cheeses. Of all the fumigants tried it was the most successful, and later experiments with this substance justify this statement. A full account of the carbon bisulphide treatment is given below.

Another gas experimented with was carbon di-oxide, and the result was remarkable. The air in a gas jar containing mites was displaced by carbon di-oxide, and the mouth of the jar closed with a greased plate. On examination with a lens the mites were found to be motionless, and apparently dead. The jar was kept sealed for four days, during which time no motion was observed. The lid was then removed, and the carbon di-oxide replaced by air. In a few minutes the mites revived, after a period of suspended animation lasting for ninety six hours !

The fact that many insects possess the power of living in an atmosphere rare in or altogether free from oxygen, is well known, especially in such insects as the Grain Weevils,* and it is important in the case of the mites, because it demonstrates the extreme difficulty of finding a method of killing them, at any rate when they have been allowed to breed unchecked for some time. It further shows how ineffective any fumigation method is likely to be, and points to the conclusion that a contact poison would be more successful than a gaseous one. And such a contact poison is carbon bisulphide. This substance is a heavy, yellow and evil-smelling liquid, which vapourises very readily and leaves behind neither smell nor taste. It is used on flour, grain, and many other food stuffs, and destroys all forms of animal life. It is not harmful when breathed in small quantities by human beings, *but it is highly inflammable and should not be brought near a light.* The vapour of the bisulphide kills the mites almost instantaneously, but, as already mentioned, it does not work under the base of the cheese, neither does it kill the eggs. Four 10 lb. Stiltons were treated with the bisulphide, were freed from mites, and kept free for four months, when they were returned to the dairy and sold. Several methods of using the substance were tried until the most satisfactory was found.

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* Cf. Cole, "The Bionomics of Grain Weevils," *Journal of Economic Biology*, 1906, Vol. I., part 2, p. 7.

(1) The cheese was covered with a bell jar, and a shallow vessel containing a quantity of the bisulphide was placed on the top of an inverted gas jar inside the bell jar. It is necessary to elevate the fumigant because its vapour is heavy and works downwards. The bisulphide was then left to evaporate. Two days later the cheese was uncovered and it was found that the majority of the mites had been killed but that those on the base of the cheese were still alive, and they would, of course, crawl all over the cheese and renew their attacks on the freed portions.

(2) The cheese was sprayed with the bisulphide by means of a small garden spray. It was then inverted and the base treated. This method is, however, wasteful.

(3) The cheese was painted all over the surface with the bisulphide by means of a large paint brush. This method was found to be the most effective, though it might be difficult of application on a large scale and the cost might be prohibitive.*

It was necessary to treat the cheeses three times, once to kill the adults, a second time (at an interval long enough to allow for the hatching of the eggs) to kill the larvæ, and a third (after a similar interval) to make sure that all were killed. Thus the four cheeses received their first treatment on 11th September, 1916, the second twelve days later, and the third after the same interval. No mites were afterwards observed, the cheeses ripened satisfactorily and were kept free from mites from October, 1916, to February, 1917, when they were returned to the dairy and sold.

The bisulphide was also used for fumigating cheeses in a small cheese room of about 500 cubic feet capacity. Thirteen Wensleydales were experimented with, viz., five old ones with cloths, four old ones from which the cloths had been removed, and four new ones, all attacked by mites. On 30th October, 1917, the room was fumigated by pouring 1 lb. of carbon bisulphide into shallow vessels elevated above the cheeses. The fumigation was repeated on 14th November, and though the experiment is not yet complete the results so far are as follows :—The old cheeses, which were much cracked and broken, do not show much improvement. The new ones, however, while not free from mites altogether, show a decided improvement on cheeses of the same date kept in the cheese room at the dairy. Earlier treatment in August or September, before the mites had made holes in the cheeses, would have shown a more marked improvement.

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* The price of carbon bisulphide is at present 11*d.* per lb. About 5–8 oz. were used for the four cheeses in question at each fumigation, and there were three such fumigations, so that the total cost was about 1*s.* 6*d.* for the four cheeses. The cheeses were subsequently turned but not brushed, as there was no dust on them. The cost of brushing, therefore, was saved.

The only other substance which killed the mites within a few minutes was carbolic acid. Carbolic acid is, however, poisonous, and cannot be used on the cheeses themselves, but it might be employed for the shelves, and especially for the corners. A 5 per cent. solution was found to be most efficacious, and an increase in the strength was not found to kill the mites in less time than the two minutes allowed for the 5 per cent. solution.

Methods of Prevention.—1. The greatest care should be taken to cleanse not only the room where the cheeses are ripened or stored, but also all utensils used in the making of the cheeses. Mites hide in cracks and crevices where it is difficult to get at them. The rims and joints of moulds harbour them as well as joints in woodwork. It will often be found that mites are present on the cheeses before they have been put in the cheese room, and these cheeses have probably been infected from utensils used in the dairy.

2. The windows should be netted to prevent the entrance of flies and moths, which carry mites. Doorways should be provided with a netted inner door for the same purpose. This precaution would also prevent cheese flies from getting at the cheeses and hence would eliminate " skippers."

3. There should be a very thorough cleansing of the cheese room itself between one Stilton season and the next, in order to kill those mites that persist and are waiting to attack the new set of Stiltons. Corners, window ledges and crevices of any kind are their favourite hiding places, and the whole of the ceiling, walls, floors, shelves and their supports should be washed over and all woodwork treated with 5 per cent. carbolic acid solution. If the walls are not tiled or made of glazed brick, they should be limewashed every year. Limewash does not kill mites, but the movements of the brush would dislodge them and probably crush them.

4. It is advisable to have movable shelves of short lengths. Glass shelves would, of course, be the best if the cost were not so great, as the cracks in wooden shelves only increase with scrubbing. The supports should be made of iron and the floors of concrete, with gutters for drainage. If the Stilton room be not in use between the Stilton seasons, the shelves might be removed, treated with carbolic and then kept in daylight and allowed to dry.

Remedies.—1. Filling the cheese room with steam vapour and dipping the cheeses in hot water have been shown to be useless as remedies. Another method in common use is to dip the cheese in formalin. Mites have been kept immersed in 5 per cent. formalin *for over a week*, and at the end of that time many were still alive! These three remedies can, therefore, be ruled out as useless.

2. Brushing attacked cheeses daily and removing the mite dust considerably lessens the seriousness of the attack.

3. Fumigating the cheese room with carbon bisulphide, in the proportion of 1 lb. of bisulphide to every 500 cubic feet of space during August or September, will keep the mites under control, though it is unlikely that it will succeed in exterminating them. There should be at least two fumigations, the second about 12 to 14 days after the first. A third fumigation after the same interval is advisable. Painting the surface of the cheeses with the bisulphide is the only way of getting rid of the mites altogether. Three such paintings at intervals as above are necessary.

Report of the Development Commissioners for 1916–17, in Regard to England and Wales.

As has been pointed out in the Commissioners' reports for the years ending 31st March, 1915 and 1916, since the commencement of the War advances from the Development Fund have been mainly confined to schemes already established with the expectation of continued help from the fund, for which just sufficient advances have been recommended to secure continuity.

As regards new schemes the Commissioners have continued to recommend expenditure upon the preparation, by way of preliminary surveys and reports of projects of development for commencement after the War when the employment of labour upon a large scale may be desirable. They have also recommended expenditure on certain new schemes in order to meet war conditions, particularly in connection with food supply and natural products. The two most important new advances recommended by them during the year, namely, £125,000 for purchase of an estate for sugar beet growing, and £50,000 for improving the fish food supply by installing motors in fishing boats in England and Wales, fall under this heading. These two advances amount to one-half of the whole sum recommended for the year, and account for the large increase over the total amount recommended in the previous year. A largely increased supply of plants for afforestation purposes, and increased growings of flax for aeroplane cloth, are other instances where war conditions have called for extra expenditure from the Development Fund. With exceptions such as these the Commissioners have continued as in the last two years to observe a careful economy in the advances recommended.

Agricultural Research and Education in England and Wales.—In earlier reports the Commissioners have explained in some detail the important schemes aided from the Development Fund for the development of Agricultural Research at Universities, Colleges, etc., the extension of advisory and local investigation work, and the development of agricultural education by means of farm institutes. For the continuance of the research scheme in England and Wales during 1917–18 the following grants from the Development Fund to the Board of Agriculture and Fisheries have been sanctioned :—

	£
Grants to colleges and institutions in aid of—	
(*a*) Scientific research and experiments	19,600
(*b*) The extension of advisory and local investigation work	8,000
(*c*) Special investigations and research, and scholarships	2,400
(*d*) Enquiries and experiments, etc., by or on behalf of the Board	600
Expenses of administration	880
	31,480
Less amount not payable from the Development Fund	1,750
	29,730
Research in animal pathology to be undertaken at the Board's veterinary laboratory, 1917–18	2,000
Research Institute in Plant Pathology at Kew— Salaries, wages, and maintenance expenses, 1917–18	1,358

The proposed expenditure in respect of the grants for research institutes and advisory centres contemplates only the carrying on of existing work, and no new work of any importance was started last year with the exception of investigations bearing directly on the War, with which some of the workers are engaged, particularly at Cambridge University.

A grant to the Board of Agriculture and Fisheries of £16,445 was made in aid of agricultural and dairy education during the year 1917–18 to provide for—

	£
(i.) Grants to local authorities and school managers under the farm institute regulations	9,500
(ii.) Grants in aid of a scheme for the encouragement of cheese-making by the establishment of migratory and co-operative cheese schools ..	2,375
(iii.) Administrative expenses of Advisory Councils established in connection with the farm institute and live stock schemes of the Board..	1,000
(iv.) Administrative expenses of the Board	3,370
(v.) Grant to the Seale Hayne Agricultural College for the maintenance of the college farm for the training of women	*200
	£16,445

Farm Institutes.—Reductions have been made in the grant provided for the establishment of farm institutes. Building and extension schemes have been postponed by Local Education Authorities until the end of the War, and the reduced grant is required to meet the commitments under the farm institute regulations.

Vegetable Drying and Fruit Preserving.—At the close of the year the Commissioners had under consideration an application from the Board of Agriculture and Fisheries for a grant of £7,900 to meet additional capital expenditure on the vegetable drying and fruit preserving experiments which are being carried out in Warwickshire under the supervision of a committee appointed by the Board in order to test the prospect of these industries on a commercial scale.

Emergency Educational Schemes.—A grant of £3,700 was sanctioned to enable the Board in consultation with the Commissioners to assist new emergency schemes of an educational or quasi-educational character. Advances from a similar grant made the year before were approved for the establishment of migratory and co-operative cheese schools, and the assistance of schemes for augmenting the production of eggs and poultry.

Effect of Electrical Discharge on Crops.—A grant of £1,330 was made to the Imperial College of Science and Technology for an investigation during 1917 into the effect of electrical discharge on the growth of crops.

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* Earlier in the year a similar grant was made for 1916–17.

Eggs and Poultry.—The following grants were recommended.

	£
Board of Agriculture and Fisheries :—	
Scheme for augmenting the production of eggs and poultry during the season 1916–17 by the establishment of 300 centres in England and Wales for the distribution of reliable eggs for hatching, 20 stations for the distribution of day-old chicks, and the provision of five incubating stations. A grant of £1,250 was made for this scheme during the season 1915–16. As a stimulus for the home production of food, the Commissioners recommended an increased grant for the extension of the scheme which had been widely adopted and proved generally useful	3,200
Utility Poultry Club :—	
Grant in aid of the continuance of the Burbage breeding experiments during the year to 30th September, 1916	358

Cultivation and Preparation of Flax, Hemp, and Tobacco.—The following grants were recommended :—

(1) *British Flax and Hemp Growers' Society :—*

(*a*) £4,575 to meet the expenses of the Society during the six months to 30th September, 1916.

(*b*) £6,275 to meet the expenses of the Society during the year to 30th September, 1917.

The above grants included capital sums amounting to £1,865 for the extension and adequate equipment of the scutching, retting and deseeding experiment station near Yeovil. The grants made cover all the expenditure of the society, and all moneys received by it from the sale of flax, fibre, or other products are paid over to the Treasury for the credit of the Development Fund.

Owing to the War and the consequent increase in the price of flax, the acreage has been increased, and it is expected that the enhanced prices will cause a considerable reduction in the cost to the Development Fund of these experiments and at the same time stimulate the revival of the industry in this country.

Shortly after the close of the year to which this report relates the Commissioners recommended a supplementary grant for a considerable extension of the society's work in 1917, undertaken partly in order to ensure a future supply of material for the production of aeroplane cloth, and partly in order to increase the growth of linseed as a feeding stuff for stock.

(2) *Leeds University :—*

A grant not exceeding £125 to meet any excess of expenditure over the receipts of the flax experiment station at Selby for the year to 30th September, 1917.

(3) *British Tobacco Growers' Society* :—

£1,200 for the continuance of the work of the Society during the year 1916–17. The Society is conducting experiments in the cultivation and preparation for market of tobacco and nicotine products in order to ascertain whether tobacco can be grown in this country with profit to the grower. Confidence in the possibilities of the tobacco crop was so far established as to enable the Society for the first time in 1915–16 to make contracts with growers to grow the tobacco at their own risk and at a fixed price, with the stipulation that only sound saleable leaves would be accepted. The arrangements proposed for 1916–17 are an advance in the experimental stage. The expense of rehandling, transit and selling will be borne by the Society as before, but the grower receives for the crop not a fixed price but the price actually obtained upon the market. The Commissioners considered the question of the suspension of the Society's work until the end of the War, when the work might be continued and the experiments brought to a conclusion. The Society claimed that the experiments had reached a stage at which their abandonment or suspension would involve a serious loss of the value of all past expenditure, and a largely decreased grant was applied for to carry the work on. The Commissioners came to the conclusion that a case had been made out for the limited operations proposed. The acreage was greatly reduced. and confined to a district in the county of Norfolk with the kind of land shown by experience to present the best possibility for the tobacco crop from an economic point of view.

Encouragement of a Beet Sugar Industry.—The Commissioners are of opinion that a trial on a considerable scale of a sugar beet experiment should be made, and that the present time affords particular reasons for initiating such a trial. The Kelham Estate, Nottinghamshire, is exceptionally suitable for such an experiment, and the Commissioners recommended a loan of £125,000 for its purchase with a view to the establishment of a beet sugar industry in this country. The question of the building, management, and finance of a factory remains for consideration, and in the meantime the estate is held upon trust for the purpose of a beet sugar scheme, and is subject to the direction of the Lords Commissioners of the Treasury.

Horse and Live Stock Breeding.—The following grants were recommended :—

Board of Agriculture and Fisheries :—

£35,100 to meet the cost during the year 1917–18 of the scheme for the improvement of heavy horses, cattle and swine, the extension of milk recording, and the employment of live stock officers at Agricultural Institutions in England and Wales. Details of the scheme are given in the report by the Board on the administration of the grant for 1916–17 published in the Board's *Journal* for the month of August, 1917.

Cattle Testing Station at Pirbright.—A grant of £465 was made to meet the loss on the working of the station for the period to 31st March, 1914.

Organisation of Co-operation among Agriculturists in England and Wales.—A grant to the Agricultural Organisation Society for its work during the year 1916–17 was recommended as follows :—

(*a*) A block sum of £5,000, and
(*b*) An additional sum equal to the amount of the subscription income of the Society for the year. This sum amounted to £1,861.

Forestry.—The Commissioners have continued to give careful consideration to the whole question of the development of forestry in the United Kingdom. In earlier reports they expressed the view that the first requirement for forestry development is effective education in forestry at suitable centres, regulated by organised research and demonstration, and the provision of a body of trained foresters for the work to be done. At the outbreak of the War good progress had been made with this essential preliminary work, and in the Commissioners' opinion sufficient trained men were available to enable schemes of afforestation to be commenced.

Increased expenditure on education and research will be necessary if the large schemes of State forestry demanded by the new conditions created by the War are to be carried out with efficiency and economy.

During the year the Commissioners reviewed their policy with regard to new forestry schemes to be financed from the Development Fund, especially in relation to the alternatives of purchase and long lease of land, and to their proposals for afforesting privately-owned land on the basis of a division of the proceeds when they accrue. The Commissioners prepared a provisional Memorandum setting out the principles by which they proposed to be guided in recommending advances for approved schemes in the United Kingdom framed on the basis of the leasing of land, as an alternative to the proceeds-sharing proposals which they had made early in 1914 for the afforestation of privately-owned land. A copy of the Memorandum was sent to the three Agricultural Departments of the United Kingdom responsible for the administration of forestry.

It is not necessary for the Commissioners to urge the importance of the afforestation of land which is at present unproductive. The experience of the War has shown that the nation must in prudence be prepared to incur substantial expenditure in increasing the home-grown supplies of timber. Much of the waste land of the country can only be turned to account by putting it under timber; and there are other areas of unimproved land which can be rescued from their present unproductive condition by composite schemes of afforestation and reclamation. A forest will afford seasonal employment for men occupying or employed on small farms, and will itself be economically worked by the labour so employed.

The Development Commissioners provided as follows in aid of Forestry in England and Wales :—

A grant of £4,300 to the Board of Agriculture and Fisheries was recommended for the continuation in the year 1917–18 of the scheme for research, forestry instruction and advisory work at four centres in England and Wales, minor forestry experiments and surveys.

It was represented to the Commissioners by the Board of Agriculture that in view of the large amount of timber which was being cut down in this country, the difficulties in which nurserymen were involved owing to the shortage of labour, and the fact that seed and seedlings of enemy origin, largely purchased in normal times by nurserymen, were no longer available, it was desirable to raise a supply of forest-tree seedlings in case there might be a shortage for replanting after the War. A grant was made the year before to the Commissioners of Woods for the provision of nursery stock, but the Development Commissioners were satisfied that the sowings should be considerably extended, and they accordingly recommended grants to the Board of Agriculture and Fisheries of £1,270 and £3,500 for a similar purpose to meet expenditure during the years 1916–17 and 1917–18 respectively. A further grant of £4,076 was also made to the Commissioners of Woods for expenditure in 1916–17.

A grant of £200 was made to the Commissioners of Woods towards the cost of the maintenance of the Forest of Dean Demonstration Area during 1916–17, on the condition that the

Land Revenues of the Crown continue as hitherto to bear the cost of general improvements and maintenance of Dean Forest and adjoining woodlands.

Reclamation and Drainage of Land.—With a view to the improvement of the drainage of the Upper Ouse Valley, and as a necessary preliminary to an undertaking which may be incidentally useful in providing employment on a considerable scale for unskilled workers after the War, the Commissioners recommended an advance not exceeding £250 for an engineer's report.

In July, 1916, they recommended a grant of £600 to the Land Reclamation Society, one-half being for the expenses of the Society for the year 1916–17, and the other half for a survey and engineer's report as a preliminary to the reclamation of a tract of land in Cardiganshire, whereby it is anticipated that a very valuable area may be made available for agriculture by the execution of drainage works.

Fisheries and Harbours.—Advances were also made by the Commissioners for the construction and improvement of harbours and for the development and improvement of fisheries in this country.

Winter Egg Production.

THE bulk of the eggs produced in late autumn and early winter are laid by pullets, and it is on the number of eggs produced at this time, when prices are highest, that the financial success of most poultry farms very largely depends.

The first steps towards the production of such eggs must be taken in February.

Heavy Breeds.—From the second week in February to the end of the first week in March, eggs from the heavy breeds should be put into incubators and under hens. If they are of good laying strain and have been properly reared March-hatched pullets of the heavy breeds should begin laying in October and continue laying until the following March or April before becoming broody. Pullets hatched *before* March are likely to begin laying in August or September, moult in October, and practically cease laying for the rest of the year. Pullets of heavy breeds hatched *after* March cannot be relied on to lay until near Christmas.

Light Breeds.—Eggs from the light breeds should be put down for hatching from the second week in March to the end of the first week in April. These will hatch in April, and, under suitable conditions, the pullets will begin to lay at the same time as the March-hatched pullets of the heavy breeds. The results obtained will depend on three factors:—(1) Breed, (2) Strain, (3) Conditions (including management).

(1) **Breed.**—An examination of the results of recent laying competitions in England will show that at the present time the two most profitable breeds *for egg-production alone* are the White Wyandotte and White Leghorn. For those whose object is to produce *both eggs and table birds for their own use* the Light Sussex, Rhode Island Red, and Buff Orpington may be recommended.

Before making a choice of breed, local conditions should be carefully studied. In cold, flat, badly-drained country, White Leghorns and light breeds generally will not lay well in winter unless they have ample scratching space on a dry floor, in a well-lighted house, facing south or south-east.

There are good laying strains of many other breeds, besides those mentioned. If in any given locality it is found that a number of poultry-keepers are doing well with any particular breed, it will generally be safe to follow their practice.

(2) **Strain.**—Strain is more important than breed. It is quite possible to find flocks of chance-bred White Wyandottes that will be no more productive than a flock of barn-door hens. A study of laying competition results will show the enormous difference between such birds and those of the best "bred-to-lay" strains. In making the choice of a strain much the same judgment is required as is exercised by an expert breeder in the choice of birds for his breeding pen. Egg records are important, but soundness and stamina are equally so. A little time and money spent at the start in discovering where to obtain the best stock satisfactory in all these points will be repaid many times by ensuing results.

(3) **Conditions—including Management.**—The difference in the results to be obtained from good and poor strains is no greater than the difference in results due to good and bad management. Success in utility poultry-keeping depends on careful and intelligent attention to a considerable number of small details; there is not much "luck" about it. What appears to be due to "good luck" is nearly always due to good management, and "bad luck" to bad management.

For winter egg-production it is essential to have clean, dry, well-ventilated houses with floors covered deep with loose, dry litter, in which the birds can get exercise in bad weather; it is necessary that the birds should have plenty of exercise and not perpetually suffer from cold feet. (For information on poultry houses see Leaflet No. 294, *Poultry Houses and Appliances for Allotment Holders, Cottagers and Others.*)

Other Essentials.—Other essentials are:—

(*a*) Food of the right kind, in the right quantities, given at regular times. (Information on this subject will be found in Food Production Leaflet No. 3, *Notes on Poultry Feeding.*)

(*b*) Plenty of clean fresh water—slightly warmed in very cold weather.

(*c*) Abundance of grit, and some calcareous material for shell production.

It is difficult to exaggerate the importance of hatching at the right time in order to get the highest output of eggs in winter. To make certain of the best results it is best to use incubators. Incubator-hatched and brooder-bred chickens, if well looked after, will thrive as well as, if not better than, those hatched and reared by hens.

The important small details of management can only be learned by practical work. Very valuable help can often be got by a visit to a fellow poultry-keeper, and in many counties the educational staff includes a poultry instructor or instructress who welcomes any opportunity of giving help or advice. (This article is being re-issued as Leaflet No. 129.)

Feeding of Poultry: *From the Harper Adams Agricultural College, Newport, Salop.*

FEEDING problems in connection with poultry have been somewhat simplified since harvest owing to the increased quantities of tail corn which have become available as the result of the usual autumn threshing operations. The demand for such grain on the farm for other classes of stock has limited the general supply, and the non-producing poultry-keeper has not benefited to the same extent as the producer of grain crops. The former class may well consider undertaking the production of grain in view of the general shortage of grain which will be felt keenly by poultry-keepers during the present year, and foresight more than ever will be required to ensure successful results. Under existing regulations an allotment-holder may use for his own purposes the produce of his holding of wheat, oats, or other cereals, providing the area grown is not in excess of half an acre. Prices can no longer be the ruling factor in the drawing up of a food ration, as the difficulty of obtaining supplies of the various foodstuffs necessitates the judicious use of whatever may be obtainable at the moment.

The following list of recent prices, compared with those of a year ago, shows the upward trend which has been maintained:—

	Per cwt. 1917.	*Per cwt.* 1916.
Sharps	18/8*	18/
Bran	15/6*	16/6
Fish meal	22/3	20/6
Meat meal	23/3	—
Clover meal	12/	12/6
Palm kernel meal	16/*	—
Biscuit dust	23/	23/
Wheat	16/ (tail)	18/
Oats	13/1 ,,	18/6

Fish meal has been increasingly difficult to obtain, and at times has been practically unobtainable, while the prices show a 10 per cent. rise on twelve months ago.

Clover meal has remained about the same price, but the samples are inferior and show an increased tendency to dustiness. The greater demand for clover meal is in large measure no doubt due to this article being confined to the poultry stock of the country.

As these two classes of feeding stuffs are mainly responsible for maintaining the proteid content in a dietary suited to the requirements of laying hens the scarcity is serious, and the use of such substitutes as leguminous seeds should be considered, as the effect on egg-production is very marked where the ration is reduced without some such substitution. Even at present prices the use of such seeds and their products when available should receive the careful consideration of poultry-keepers.

Palm kernel meal, which has proved a useful addition to the list of feeding stuffs, is only obtainable in small quantities, and appears to be absorbed into the more costly compound cakes and meals. The percentage of oil which this by-product contains is probably one of the most desirable additions to the ration at this time of the year.

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* Including delivery.

In the College trials a high standard of egg-production has been maintained by the use of the following feeding stuffs :—

Sharps, bran, fish meal, meat meal, palm kernel meal, maize meal, clover meal, biscuit meal, with wheat, oats (tail corn) and cracked maize.

The quantities used daily for 700 birds amounted to—sharps, 31 lb., bran, 9½ lb., fish meal, 6 lb., palm kernel meal, 2 lb., maize meal, 15 lb., clover meal, 7 lb., biscuit meal, 9½ lb. The approximate proportions were as follows :—

Sharps, 6 parts.
Bran and maize meal, 3 parts each.
Biscuit and clover meal, 1½ parts each.
Fish meal, 1 part.
Palm kernel meal, ½ part.

The fish meal and meat meal are given on alternate days. Vegetable products of various kinds are usually fairly plentiful at this time of the year, and include such foods as cabbages, swedes, and small and diseased potatoes, and these should be made full use of in addition to the above.

The grain mixture has contained cracked maize, but this will be unobtainable unless stocks are held, and must soon disappear. The proportions fed amounted to 2 oz. per head of mixed meals and 2 oz. of grain per head per day.

THE following note has been communicated to the Board by Mr. T. F. Prime, M.R.C.V.S. :—

Feeding Pigs on Kitchen Waste.

Finding no data whatever recorded as to the amount of kitchen waste in the form of potato, vegetable and fruit-peelings, contents of the stock-pot and edible garden waste—collectively called "Wash"—which is required to produce one pound of pork, the writer started in January, 1917, to keep a few pigs entirely on this food as an experiment. Most pig-keepers stated that pigs could not be fattened on it without some meal. In order that the experiment might be of more value and help to the beginner in the vicinity of a large town, where this class of food is plentiful, the management of the pigs was given to a town-bred man who had never before had anything to do with pigs. The kitchen waste had formerly been burnt or thrown on the dust-heap. During the winter months the food was cooked, a stove usually employed for heating purposes being utilised for the purpose, but during the summer the food was used uncooked. The pigs were weighed on delivery to the writer, the food was weighed daily, and the pigs were weighed each week, records being kept.

The following is the record of twelve months of four weeks each. On 9th January, three pigs were bought and weighed 18 lb., 34 lb. and 29 lb. each respectively, or 81 lb. in all. In the four weeks ending—

	The pigs consumed	*The pigs. weighed*
5th February	397 lb.	108 lb.
5th March	560 „	165 „

The two heaviest were killed and weighed 40 lb. and 48 lb. carcass weight respectively.

On 10th March four pigs, two weighing 24 lb. and two weighing 25 lb. each, or 98 lb. in all, were purchased, and in the four weeks ending—

	The 5 pigs consumed	*The 5 pigs weighed*
3rd April	480 lb.	166 lb.
1st May	558 „	227 „
29th „	598 „	337 „
25th June (four pigs)	443 „	290 „

One pig killed on 7th June weighed 83 lb. carcass weight. In the four weeks ending—

	The remaining 4 pigs consumed	*The remaining 4 pigs weighed*
24th July	554 lb.	416 lb.
and in the period up to 28th August	1,078 lb.	712 „

On 1st September, five pigs (two weighing 18½ lb. each, and three 22 lb. each, or 103 lb. in all) were purchased. In the period ending—

	The 5 pigs consumed	*The 5 pigs weighed*
2nd October	396 lb.	161 lb.
30th „	480 „	240 „
27th November	560 „	344 „

In all 6,104 lb. of food were used, and 870 lb. increase in live weight were obtained, or, roughly, 7 lb. of "Wash" produced 1 lb. live-weight increase. During the whole period only 28 lb. of meal were used, and this was due to a shortage of kitchen waste.

The pork was of excellent quality and, if anything, too fat, and could not when cooked be distinguished from meal-fed pork.

Incidentally, it was found that the amount of kitchen waste per head in a household was from 1 lb. to 1½ lb. per week, and this, if collected and fed to pigs, would mean a yearly production of millions of pounds of pork. The greatest difficulty in the utilisation of this food is the collection, but this has been easily settled in some parts of the country, either by the corporation carts collecting it or by the formation of co-operative pig clubs having the following rule: *No person shall be eligible for membership unless able to contribute to the swill-tub.*

Notes on Feeding Stuffs in February:

From the Animal Nutrition Institute, Cambridge University.

SINCE last month the feeding stuff situation has become much more acute, and the latest estimates of all concentrated feeding stuffs, including oilcakes and meals, millers' offals, tail and damaged corn, oats, beans, peas, brewers' grains and malt culms, and other by-products, indicate that the total supplies of all these articles are barely sufficient to provide minimum rations for horses actually at work and cows actually in milk until the grass is likely to be ready.

In these circumstances it is not worth while to suggest rations for any class of stock except working horses and milking cows. The only course to adopt is to point out emphatically that any farmer who uses concentrated food for the production of beef, mutton or pork is, to all intents and purposes, robbing the working horses and milking cows.

The prices of practically all the concentrated feeding stuffs are now fixed and, together with the analyses, have been published in former numbers of the *Journal*, and are readily accessible in the reprints of the last two months' "Notes," which can be obtained free on application to The Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1. It does not seem worth while, therefore, to reprint these figures.

Horses.—The greatest possible economy should be adopted in the ration of concentrated food for horses. Otherwise, the supply of oats and other horse corn will not last until the grass comes. Every effort should be made to spare concentrated foods by replacing them as far as possible by roots, of which mangolds at this time of the year are the most suitable.

Milking Cows.—Although it is pre-eminently necessary to maintain the milk supply, all cow-keepers should spare no effort to economise concentrated food. In many cases considerable economy will be effected by rationing each cow according to her milk yield. Taking as a basal ration for cows giving 2 gal. of milk or less

Roots	70 lb.
Hay and Straw	20 „
Concentrated Food	4 „

An extra allowance of 2 lb. of concentrated food for each gal. of milk over 2 gal. will, as a rule, maintain the milk yield and ensure considerable economy in the use of concentrated food as compared with the common practice of giving a uniform ration for all cows irrespective of their milk yield.

The Food Controller has recently issued an Order to all holders of concentrated food that they should satisfy the demands of cow-keepers before they sell concentrated food for any other purpose. This should ensure that cow-keepers will be able to buy the food they require for their cows.

Cattle Fattening for Beef Production.—The prospective shortage of feeding stuffs is so acute that it is necessary that the use of concentrated food for this purpose should be discontinued. Every pound of cake used for bullocks means a pound less for horses and cows. It is recognised that bullocks which have been up to the present getting cake will go back in condition if the cake is withdrawn, but with the present scarcity of meat such bullocks will be readily bought by the butcher and their immediate sale will help to relieve the present meat shortage. Although they may not yet be in the condition which is commonly recognised as fit for slaughter, they will, nevertheless, be readily acceptable under present conditions. It is perfectly clear to anyone who has studied the estimates of concentrated foods, that fattening in the ordinary sense has now become quite impossible, and the country must depend for its beef on the slaughter of animals in lean condition, until fattening on grass once more becomes possible.

Sheep.—As in the case of bullocks, it is necessary to discontinue the use of cake for fattening sheep. Sheep that have been getting cake should be sold to the butcher as soon as possible, so that they may not lose flesh. After they are gone, the country must eat lean mutton until the grass comes round again. It may be possible to spare a very small cake ration for lambing ewes, where the conditions are such that the use of cake is absolutely necessary. It must, however, be remembered by all who use cake for this purpose that every pound of cake used is being taken from the supply which should be reserved for horses and milking cows.

Pigs.—The shortage of corn suitable for bread-making is so great that it is against the national interest to use any kind of cereal meal for pig food, and the number of pigs in the country must undoubtedly be decreased to meet this situation. Pig keepers must remember that the food supply of the country is actually decreased by converting 4 or 5 lb. of meal into 1 lb. of pork or bacon.

Notes on Manures in February:
From the Rothamsted Experimental Station, Harpenden, Herts.

The Economical Use of Superphosphate.—One effect of the War in every country has been to increase the difficulty of making superphosphate; supplies of this manure have, therefore, been restricted and prices have risen. British farmers have suffered less than others, and considerably less than French farmers. In France superphosphate, which in 1914 cost 5½ frs. per 100 kilos. (about £2 4s. per ton), had risen in 1917 to 26½ frs. for the same quantity (£10 12s. at the same rate of exchange), which is far above the price being paid in England. In view of our restricted supplies, however, it is indispensable that the most economical use possible should be made of superphosphate on the farm.

The following Table shows the crop increases which have been obtained in a number of trials per cwt. of superphosphate applied; the dressings have varied between 2½ and 6 cwt., but they are reduced to a common basis of 1 cwt. for purposes of comparison. The increases yielded from 1 cwt. of sulphate of ammonia or nitrate of soda is also given:—

	Per 1 cwt. superphosphate or high-grade basic slag.	*Per 1 cwt. sulphate of ammonia or nitrate of soda, or 1½ cwt. nitrolim.*
Wheat, grain ..	0—1½ bush.	4½ bush.
,, straw	½—5 cwt.	5 cwt.
Barley, grain	2—3 bush.	6½ bush.
,, straw	0—2 cwt.	6½ cwt.
Oats, grain	1—3½ bush.	7 bush.
,, straw	0—2 cwt.	6 cwt.
Hay ..	—	8—10 ,,
Mangolds ..	20 ,,	32 ,,
Swedes ..	20—40 ,,	20 ,,
Potatoes ..	10 ,,	20 ,,

Thus superphosphate (which contains 11·8 per cent. of phosphoric oxide P_2O_5) is about half as effective as 1 cwt. of sulphate of ammonia (which contains 20 per cent. of nitrogen, N.).

Swedes.—The largest increase is usually obtained in the case of swedes, the reason probably being that superphosphate enables the young plant to make rapid root development and to produce a fibrous mass of rootlets that can thoroughly search the soil for all necessary nourishment; further, the root is enabled to swell.

Mangolds also respond well, the rapid root development in this case enabling the plant to become well established before dry weather sets in; once this stage is reached it can withstand drought quite well, otherwise it tends to suffer. Mangolds generally contain more dry matter than swedes, so that a 20-cwt. increase in crop represents a larger gain in animal food than the figures indicate. Taking this difference into account mangolds sometimes respond better than swedes to superphosphate.

Potatoes.—The potato crop also responds, production and swelling of the tubers being facilitated. Any farmer who grows potatoes will necessarily have to reserve sufficient superphosphate for them even at the risk of letting other crops go short. Sufficient should also be kept for mangolds because of the great amount of animal food this crop yields per acre On the other hand, in the southern and eastern counties, swedes and turnips do not yield as much animal food per acre as certain other crops, and where there is a shortage of superphosphate careful examination should be made to determine whether part of the acreage cannot be replaced by something more bulky.

Cereals.—The increases in grain from superphosphate are less striking, but for several reasons the claims of the grain crop for a share in the available supply should not be overlooked.

The improvement in root development is an advantage here, especially on heavy soils and for barley. Even more important is the effect on ripening. Superphosphate hastens ripening, thereby greatly facilitating harvest operations in a wet district. Barley and oats should, therefore, always receive their share, and in the north wheat also, though in the south wheat can get along very well without phosphates, especially when it is grown after potatoes or mangolds.

The increased yields of *oats* for the superphosphate actually applied were, at the centres named :—

For 2 cwt. superphosphate :—

Lancashire, average of all centres	2½ bush. grain.	½ cwt. straw.
Aberystwyth	17 ,,	4 ,,
Shrubland Park, Suffolk ..	4 ,,	3 ,,

For 3 cwt. superphosphate :—

Kineton	10¼ ,,	—
Ireland (average of all centres)	3 cwt. grain.	5 ,,

Barley gave the following increases for a dressing of 2 cwt. of superphosphate :—

3½ bush. grain, and a *decrease* in straw of 3½ cwt. at Tibthorpe, Yorkshire.

5½ bush. grain, 3¾ cwt. *increase* in straw at Saxmundham, Suffolk.

The results of *wheat* are as follows :—

2 cwt. superphosphate yielded an additional :—

2½ bush. grain, 9 cwt. straw at Saxmundham.

No increase in grain, 1 cwt. straw, average of 4 centres in Lancashire.

3 cwt. superphosphate :—

1 bush. grain, 2½ bush. straw, at the Impington Farm, Cambridge.

Reverting to the root crops, *mangolds* have given the following results :—

3 cwt. superphosphate used alone gave an increase of 5 tons per acre at Wisbech (Cambridge expts.).

6 cwt. superphosphate used alone gave an increase of 10½ tons per acre at Somersham (Cambridge expts.).

4 cwt. superphosphate used alone gave an increase of 6¾ tons per acre at Kineton (Warwickshire).

And when used in conjunction with other fertilisers :—

2 cwt. superphosphate gave an additional 13 tons per acre at Saxmundham.

3 cwt. superphosphate gave an additional 4¼ tons per acre at Cockle Park.

4 cwt. superphosphate gave an additional 1¾ tons per acre at Irish centres.

2½ cwt. superphosphate had no effect at Beedlake, Devon.

Swedes gave increases as follows :—

For 3 cwt. super. ..	1	ton	at Harlestone, Northants.
4 ,,	3¾	tons,	average of Irish trials.
4 ,,	1¾	,,	,, ,, Lancashire trials.
6 ,,	1¼	,,	Reading.
6 ,,	7¾	,,	Winterslow, Wilts.

Potatoes gave the following increases :—

3½ cwt. superphosphate alone gave no increase at Knebworth, Herts.

4 cwt. superphosphate alone gave 2 tons increase at Littleport (Cambridge expts.).

10 cwt. superphosphate alone gave 2¼ tons increase at Ramsey (Cambridge expts.).

And when used in conjunction with other fertilisers :—

2¼ cwt. superphosphate gave 8 cwt. increase in North Wales (average 4 years).
3 cwt. superphosphate gave 1 ton increase in Cockle Park.
,, ,, ,, 1¼ tons increase in Herts.
,, ,, ,, 2¼ ,, ,, Kinnedar (Aberdeen expt.).
,, ,, ,, no increase, another centre in Herts.

Composts.—In view of the difficulties of feeding cattle and making good farmyard manure—difficulties which are already considerable, and likely to increase as the War goes on, and even to remain for some time after the War is over—farmers may be compelled to go back to the old method of making composts. This has been recently recommended in France and can be made to provide a useful quantity of organic manure. In France, as in England, the practice is very ancient and in some districts it has never gone out of use. The French method is described as follows: A wall is first built of turves enclosing a square space of the desired size; an opening is left in one side so as to allow of access; solid materials are spread evenly over the whole space and any liquids are watered in. The heap takes 6 months or a year to make. and it requires to be turned once during the process so as to effect a better mixture. The most diverse materials can be used, but nothing should be added that can be better employed by itself; thus no artificial manure should be put in. Composts allow of the utilisation of a good deal of material that is normally wasted, but in these days might well be put to some use.

THE following notes on Ensilage are in continuation of those which appeared in last month's *Journal* (p. 996) :—

Ensilage.

Modern silos are constructed with tall, air-tight walls, generally circular in section. In these very little surface is exposed to the air, and the necessary pressure is obtained automatically over the greater part of the heap by the weight of the material above. Such silos are often 30 to 35 ft. in height and generally vary between 12 and 18 ft. in diameter. They require to be carefully built of wooden staves, fitted and tongued together so as to be air-tight, or of reinforced concrete; but in view of the present difficulties in regard to supply and labour, it may frequently be necessary to resort to stacks or excavations in the soil as a means of ensiling crops.

One of the fundamental conditions for making good silage is to prevent the access of extraneous air to the fermenting material, since otherwise the silage is spoilt and becomes mouldy wherever such access occurs. The modern tall silo with its smooth air-tight walls facilitates the close packing of the silage and the exclusion of the air.

The green fodder should be chaffed before it is put into the silo ; this enables the material to pack more tightly, and also facilitates the removal of silage for feeding. A special chaff cutter and blower elevator are used for cutting and elevating the fodder through a metal tube by means of a fan ; sections of the tube then convey the cut fodder down and into the silo so that the green chaff can be spread where required. In filling the silo it is important to keep the sides well compacted by treading ; this extra consolidation is necessary to counteract the friction between the walls and the green fodder as it settles. In the centre the weight of the green fodder above is sufficient to ensure adequate pressure.

As soon as fermentation commences the material settles in the silo, but this settling does not become active until a day or two after filling has commenced ; it is very active for a week and then gradually ceases. During the fermentation the silage packs together and settles several feet in the silo ; in order to get as much fodder into the silo as possible, therefore, it is advisable either to make the filling process last over a week or ten days or else to fill the silo quickly, let the material ferment and settle, and then complete the filling a fortnight or three weeks later. If the second alternative is used, there will be a layer of spoilt fodder on the top of the first filling ; whereas, if additions are made at intervals of two or three days for a period of ten days no such waste will occur, though it may be difficult to organise the filling economically on these lines. It can, however, sometimes be practised where two or three silos stand together.

When the silo is completely filled care must be taken to prevent unnecessary loss on the top surface ; this loss will be prevented if a beginning is made to feed the silage within a few days of filling ; but where this is not convenient the surface should be packed as tightly as possible by trampling after the filling is completed. If the fodder is on the dry side, it is a good plan to add water on the top of the silo by pouring the same into the cutter whilst the last few loads are being chaffed ; this helps the fodder to pack and exclude air In other cases nettles or rushes and other worthless brushings may be chaffed and spread to a depth of 6 in. or so on the surface of the silage; such a layer helps to protect the silage from the mould.

When once the silo has been started, feeding should continue regularly each day; otherwise the exposed surface will become mouldy and spoil.

It is important to remember that, whilst silo fermentation is proceeding for two or three weeks after filling, a heavy, suffocating gas, called carbonic acid gas, is produced, which may cause the suffocation of anyone who incautiously enters the top of the silo. This gas being heavy does not readily mix with air. Being colourless it is not easily distinguished except by putting a lighted match or candle into it, whereupon the flame is immediately extinguished. It is the same gas which causes suffocation in deep wells. If the doors in the side of the silo above the level of the silage are left open, the gas pours down the shoot and escapes, the silo is ventilated, and there will be no danger of suffocation. Nor is there any danger after heating has finished.

Silage for Cows.—Silage may be fed to nearly all classes of stock-cattle, sheep and horses. It is especially suited to dairy cattle and horned stock generally, but not more than 15 lb. per day should be given to stock bulls. Though good for cattle, oat and tare silage is not a complete food; it is too bulky, whether fed together with roots and hay or by itself, to satisfy entirely the requirements of dairy cows or fatting cattle, though it may be sufficient for dry cows or store stock. Cows in full milk will need some concentrated food in addition to silage and roots or hay, though on account of the comparatively high percentage of protein in silage the concentrate need not contain nearly so large a proportion of this constituent as if the cattle were fed on roots instead of silage. The quantity of silage that should be fed to a cow depends upon her milk capacity. Generally speaking 30 to 40 lb. per day is a suitable ration, though in some cases as much as 56 lb. per day has been fed successfully. Hard and fast rules cannot be laid down for feeding, but the two following rations are suggested for average dairy cows weighing about 10 cwt. and yielding 2 gal. of milk:—*Ration I.*—Oat and tare silage 20 lb., mangolds 56 lb., straw chaff 8 lb., bran 3 lb., decorticated cotton cake 1 lb., maize meal 1 lb. *Ration II.*—Oat and tare silage 50 lb., meadow hay 7 lb., maize meal 3 lb., coconut cake 2 lb.

Feeding Silage.—The labour involved in feeding silage is considerably less than that of feeding roots. Not only do the cattle require a very much smaller weight of food—since the silage is comparatively dry—but no special preparation of the food is necessary. If in the winter fattening of cattle half the root ration is replaced by silage, a man can feed roughly half as many more bullocks. For fattening cattle between 2½ and 3 years old a ration containing 28 lb. oat and tare silage, 84 lb. of mangolds, 10 lb. oat straw, 4 lb. mixed linseed and coconut cake has given good results. For store cattle about 15 months old a ration containing 35 lb. oat and tare silage, 8 lb. straw chaff, and 2 lb. mixed cake has proved successful and kept the stock growing well.

Milk Supplies and Grass Ploughing.

STATEMENTS have recently been made (in certain newspapers) that the shortage of milk at the present time is partly due to "the reckless ploughing up of pastures" ordered by Agricultural Executive Committees at the instance of the Food Production Department. The Department pointed out last month that this criticism is quite unfounded. Not only is the land which is being scheduled for breaking up chosen most carefully by experienced local agriculturists, with due regard to its capabilities for arable cultivation, but the conversion of the pasture into tillage is calculated to secure the milk supply rather than to interfere with it.

A decreased area of grassland may reduce the supply of summer milk, but it is not during the summer months that difficulty is experienced in securing milk. The critical period for the consumer of milk is during the winter, when dairy farmers have been accustomed to rely largely upon purchased foods for feeding their cows. The existing shortage of milk is chiefly due to the scarcity of concentrated feeding-stuffs, and this scarcity will not diminish as the War goes on. Under these conditions it will be necessary for dairy farmers to have recourse to home-grown foods for maintaining their milk supply during the winter months; and the farmer who has a proportion of his land under tillage crops—such as cabbage, kale, turnips, mangolds and beans—will be much better off than the farmer who is entirely dependent upon hay and purchased feeding-stuffs.

From the point of view of milk production, an acre of mangolds, for example, is worth three times as much as an acre of meadow hay. The ploughing up of grassland is not detrimental to the milk consumer; and in view of the importance of securing a greatly increased area of corn and potatoes, the suggestion that the dairy farmer is unable to contribute to this effort without diminishing the supply of winter milk is quite wrong. On the contrary, because of the lack of feeding-stuffs, the supply of winter milk cannot be maintained unless grass farmers plough up some of their pastures and grow winter foods for themselves.

A Potato-spraying Campaign.

ARRANGEMENTS have been made for the Food Production Department's winter educational campaign in connection with the spraying of this year's potato crop; and the new scheme for the distribution of knapsack sprayers and chemicals will shortly be in operation.

The scheme will be worked through the trade. Dr. Keeble, the Director of Horticulture at the Department, and Lieutenant Ascroft, the Spraying Officer, as the result of a series of meetings with the leading manufacturers of knapsack spraying machines, representatives of the Ironmongers' Federation, the National Association of Implement Dealers, and the Wholesale Hardware Association, have completed arrangements for the widespread economical distribution of sprayers and materials in good time for this year's campaign. The trade have met the Department in the most patriotic spirit, the Wholesalers' Associations, representing the factors, agreeing not only to waive the question of the usual commission in view of the necessity of keeping retail prices as low as possible, but offering to help the scheme in other material ways.

The provisional price of knapsack sprayers is 70*s.*, but it may be necessary to raise this figure in the near future, owing to possible increases in the cost of labour and material. Wise growers, therefore, should place their orders with *local dealers*—this point should be specially noted—at once. The same remark applies to the supply of copper sulphate and soda crystals. Arrangements are being made for the manufacture of thousands of tons of these chemicals and for a very large number of machines, but the transport facilities are likely to be heavily taxed in spring and summer, and the sooner buyers get delivery of the goods the better. The price of copper sulphate will probably be Government controlled, and a reduction made on early purchases. At any rate it is in the personal interest of the buyer, as well as in the national interests, that orders should be placed at the earliest possible moment. The country is being mapped out into county areas for purposes of organisation, with an organiser and sub-organiser in each area to co-operate with and help the existing authorities.

It is hoped to bring into practical association with this scheme every progressive horticulturist and agriculturist in the country, and during the winter and early spring lectures are being given all over England and Wales, illustrated by a series of lantern slides and coloured diagrams dealing with potato disease and its prevention. This series was shown by Lieutenant Ascroft at Grantham early in December last, and was greatly appreciated by the expert horticulturists and agriculturists present. Further particulars as to these lectures, and also as to practical demonstrations in the mixing of chemicals and in potato spraying (to be given later on), are being published by the Food Production Department,

War-time Allotments.

UP to the third week of December, the Food Production Department had received applications for 204,000 war-time allotments from 1,095 districts and had provided plots under the Cultivation of Lands Order to the number of over 185,000. During the past fortnight representatives of the Department have visited Manchester and Liverpool and arranged for about 1,000 additional allotments in each area to be provided by the local authorities. At Camborne, Redruth, Truro, Coventry, Wolverhampton, West Hartlepool, Redcar, and Manchester, among other places, conferences have also taken place between members of the inspecting staff of the Department and the local authorities with most satisfactory results.

At Camborne there had been some feeling because of the issue of notice to quit to 25 allotment-holders on the sale of a field of 2½ acres. The Board's representative was able to secure the continuance of the tenancy.

In this connection it may be mentioned that the allotment holders at Well Hall who were ejected some time ago from their plots (which were wanted as a site for a church) have now been duly compensated for all loss and have been found other plots, with which they express themselves more than pleased. The

Food Production Department is always willing to enquire into grievances which may be communicated either by an individual or a society.

Farmers and Allotments.—From all over the country testimony continues to reach the Food Production Department as to the great change which has taken place in the attitude of farmers towards allotments. Formerly, as is common knowledge, many farmers objected generally to allotments and in particular to allotment holding by their own men. The War has made an enormous difference to the feeling of the farmer in this matter. At the Nottinghamshire Committee meeting recently the question of providing more allotments was raised, and the local Commissioner mentions that the Committee (consisting chiefly of farmers) took up a most sympathetic attitude. "It is gratifying," he adds, "to be able to report that this is typical of what one finds elsewhere. It arises in part from the members' appreciation of what has been done on allotments that have come under their observation, and in part from the manner in which the movement in the towns and urban districts has been developed by the Press." The Commissioner cites a personal letter from Sir Hickman Bacon as evidence of the value of allotments. "The only direction," writes Sir Hickman, "in which one can feel *sure* of increasing food production is by increasing the area of town allotments. They have had 28 acres during this year at Gainsborough, and I expect a further 10 acres will be fixed up before the end of this month. This is additional to the large area which existed previously. All the added land was formerly permanent grass, except 3 acres, which was arable."

THE following note appeared in *The National Food Journal*, issued by the Ministry of Food, on 26th December, 1917:—

Supplies of Rabbits and Game.

Advisory Committee's Appeal.—Steps are being taken to increase the supplies of rabbits and game brought to market. The Food Controller has, in particular, appointed an Advisory Committee on Rabbits and Game, and this Committee desires to secure at once the collaboration of those in a position to facilitate the game food supply, which has ceased to be a sporting problem. To the end that it may relieve the strain upon other commodities, the Committee appeals for an immediate effort to increase local supplies of rabbits. Those sent in quantity to the larger centres of population should prove still more valuable. As there is a shortage of cartridges, it rests with the trappers who remain, and the masters who employ them, to combine forces. The Committee remarks:—

"Prejudices associated with sporting tradition must be set aside, not only by those to whom the description sportsman is usually applied, but also by farmers and their assistants, whose instinct is to follow the old-fashioned method. Fewer rabbits are lost or spoilt by snaring and netting than when the gun is used; moreover, cartridges can be applied to the destruction of vermin not amenable to other methods. Patriotism requires that all available rabbits shall be got—got somehow, got anyhow, but got. Where rabbits can only be classed as vermin by reason of their tendency to destroy valuable crops, the campaign against them should be waged remorselessly."

The Committee is constituted as follows:—

Lord Lamborne, C.V.O. (Chairman), Mr. Max Baker, Mr. A. W. Blyth, Brig.-Gen. P. B. Colvin, C.B., M.P., Sir Charles Ellis, K.C.B., Mr. Francis Fulford (representing the Board of Agriculture and Fisheries), Mr. T. Comyn Platt, Sir John Spear, M.P., with Mr. Stanley M. Robinson (Ministry of Food) as Secretary.

Easy and Profitable Home Industry.—One of the readiest means of adding to our meat supplies is rabbit breeding, which, in Holland, Belgium and France has long been a cottage industry yielding large gains. Before the War, a sufficient number of hutch-bred rabbits to furnish 10,000,000 meals was sold every year to this country by Belgian and Dutch peasants. The wholesale market value of such rabbits is now 1*s.* or 1*s.* 1*d.* per lb., and, although these cottage breeders made a profit after paying freight charges they did so at half that price. The industry should now be actively encouraged throughout the United Kingdom.

Winter is not the best time for breeding; but, if rabbits can be warmly housed and well cared for, there is no reason to delay their installation. In feeding, however, it is very necessary to exclude wet and frosted greenstuff, or decayed leaves. A doe produces, on the average, 20 young in a twelvemonth, and these are fit for sale in from 13 to 15 weeks. As regards the size of rabbit to be kept, intending breeders should consult their local poulterers; or, if they agree to sell by some co-operative arrangement, the more distant buyer with whom they deal will state his requirements. As a rule, the smaller breeds sell best, the largest demand being for a rabbit that weighs from 2½ to 3 lb. when skinned; and carcases weighing as much as 8 lb. are practically unmarketable. This point settled, the breed to be obtained is one that has shown itself prolific, and that comes to maturity in the shortest possible time. In-and-in breeding must be avoided, and no doe that proves a bad mother should be kept a day longer than may be necessary. Bucks can be exchanged occasionally with another breeder. Hutch accommodation must be such that, after the young are weaned, the sexes can be separated as soon as possible.

Advice as to hutch-making, care and feeding is given in Leaflet No. 301 issued by the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, S.W. 1. On receipt of a postcard, this will be supplied free of charge. As to care, it is chiefly necessary to bear in mind that the labour involved includes daily cleaning, and a lime-washing after every litter has been taken away. Feeding must be regular; two meals daily, morning and evening, except for does in kindle or with litter, which need three. Breeders on a larger scale may require in winter beet, chicory and swedes; but cottagers who have to supplement their garden produce may use rough herbage from hedgerows and commons.

Pigeon Shoots.

LORD DEERHURST, on behalf of the Worcestershire War Agricultural Executive Committee, recently wrote to the landowners of the county asking them to co-operate by means of organised pigeon shoots in killing off as many pigeons as possible during the winter. These birds, as every farmer knows, are among the most destructive of farm pests, and the Food Production Department will be glad to see the Worcestershire scheme generally adopted. Herefordshire and Gloucestershire have already agreed to co-operate in simultaneous shoots. The day suggested for Worcester, Hereford, and Gloucester was the Thursday of each week, commencing on Thursday, 20th December, and other shoots on every subsequent Thursday up to the end of March. Derbyshire selected Saturday as the day for shoots throughout the county; but it is pointed out that in many parts of the country this day would be inconvenient, as the farmers usually go to market on the Saturday. The important point is that over as large areas as possible shoots should take place simultaneously and regularly. In his circular, Lord Deerhurst urges that to make the shooting effectual " it is necessary that someone should wait for pigeons coming into roost in every covert," and that "guns should be in their places at least an hour before sunset." He asks the owners addressed to get in touch not only with their own farm tenants, but with other farmers or persons in the neighbourhood likely to be interested, or to help in any way. "As it would be of great interest to know the number of birds killed," he concludes, "I would be very much obliged if you would send me a postcard at the end of each month stating how many have been shot in your area, in order that I may publish the results."

Parsnip Disease and its Prevention.

SERIOUS losses were caused to parsnip growers last season through the disease known as parsnip canker. The subject has since been investigated by the Food Production Department; and it has been found that the trouble is not caused by a special fungus disease but is due primarily to the presence of superficial cracks which are formed in the shoulder of the parsnip root during the growing season. The cracks are formed in great abundance when a spell of wet weather follows a dry period during August and September. In the case of carrots and turnips, somewhat similar cracks become healed over by the formation of a layer of cork; but the parsnip root is unable to form this protective layer, with the result that insects, fungi and other soil organisms easily gain entrance and set up decay. In the most badly affected districts the trouble has probably been aggravated by faulty culture, such as over-manuring and lack of lime. In order to reduce the amount of cracking to a minimum it is advisable (1) to select *moderately* good soil where liming has not been neglected; and (2) to sow late—the end of April rather than February or March. A dressing of salt previous to sowing, 5 cwt. per acre on heavy soil and up to 10 cwt. per acre on light, will also probably prove beneficial.

Potatoes in Home-made Bread.

TESTS carried out by the Ministry of Food in conjunction with the Food Production Department go to show that the use of potatoes in bread renders it much more palatable and of better texture than that which is made from Government flour alone. Moreover, the bread keeps fresh for a longer period. Householders accustomed to bake their own bread are therefore recommended to use potatoes.

The following is the recipe for home bread-making: 7 lb. flour, 1½ oz. salt, 2 oz. yeast, 3½ lb. water, ½ lb. potatoes. The potatoes should be washed and boiled in their skins; when ready they should be strained, peeled and mashed. Then weigh ½ lb. of potatoes to 7 lb. of flour. Put the flour, salt and potatoes into a basin and mix well. Heat up to 82°. Dissolve the yeast in the 3½ lb. of water, which should be maintained at a temperature of 90°. Then add the yeast mixture to the flour, salt and potatoes. Mix the whole well and knead for 10 minutes. Place on a table free from draughts for 1½ hours, then knead again and cover up for one hour more. The mixture may then be divided into pieces of equal size, moulded into the shape required, and placed in slightly warmed and greased tins. Allow it to rise for 30 minutes before placing it in the oven. Bake at a temperature of 420°. Loaves of 1 lb. weight will bake in half-an-hour; 2 lb. loaves will take 50 minutes to bake. As experience is gained it will be found that the quantity of potatoes can be increased from ½ lb. to 1 lb. (*The National Food Journal*, 26th December, 1917.)

OFFICIAL NOTICES AND CIRCULARS.

THE following Notice, dated the 12th December, 1917, has been issued by the Food Production Department of the Board:—

Glass Jars for Fruit and Vegetable Preserving: Arrangements for 1918.

With the object of securing sufficient local supplies of glass jars for next year's requirements, the Food Production Department has conferred with the Ministry of Munitions, Glassware Supply Branch, and with representatives of the manufacturing, wholesale and retail trade organisations. As a result of the Conference, arrangements have been made for retailers to begin forthwith to stock glass jars, and it is hoped that the public will assist the Department by placing their orders and accepting delivery at an early date. *Orders must be placed with a local retailer and not with the Food Production Department.*

The Conference agreed on the following maximum retail prices for glass jars of the screw-top, glass cover, rubber ring type:—

Maximum retail price:—

1-lb. jars	6*s*. 6*d*.	per doz.
2 ,,	7*s*. 6*d*.	,,
3 ,,	10*s*. 0*d*.	,,
4 ,,	11*s*. 6*d*.	,,

Bulk Orders for quantities of not less than 20 *gross*.—The trade representatives have agreed on behalf of their members for the latter to accept from Food Production Societies and similar organisations bulk orders for not less than one truck-load, viz., 20 gross (2,880 jars) at the following rates:—

(*a*) Where delivery of 20 gross or upwards is taken by the purchasing society at the railway station, and where distribution is carried out by the society:—

2-lb. jars, maximum price 5*s*. 9*d*. per dozen (£69 per 20 gross).

3-lb. jars, maximum price, 7*s*. 6*d*. per doz. (£90 per 20 gross).

(The risk of breakage to be borne by the retailer: arrangements to be made in advance between the society and retailer for checking the actual amount of breakage).

(*b*) Where the retailer receiving the order undertakes distribution to members of the society:—

2-lb. jars, maximum price, 6*s*. 3*d*. per doz. (£75 per 20 gross).

3-lb. jars, maximum price, 8*s*. per doz. (£96 per 20 gross).

Bulk Orders for quantities less than 20 gross.—For quantities less than 20 gross, the trade representatives have undertaken to request their members to allow societies ordering in bulk a reasonable rebate on the retail price.

All orders must be placed with local retailers.

In the event of a society experiencing difficulty in placing a bulk order or in securing a reasonable rebate, the society should communicate with the Food Production Department, Horticultural Division.

Official Order Forms may be obtained on application to the Ironmongers Federated Association, Apsley House, Priory Road, Sheffield, The China and Glass Dealers' Association, 17, Northgate, Wakefield, or the Food Production Department, 72, Victoria Street, London, S.W. 1.

NOTE.—Provision is being made for the manufacture of large quantities of 2-lb. glass jars. It is anticipated that a certain, albeit more limited, number of 1-lb., 3-lb. and 4-lb. jars will be available.

School Gardens and Food Production.

A CONFERENCE organised by Mr. W. C. F. Anderson, was held at the Assize Courts, Reading, on Saturday, 8th December, 1917, to discuss means of increasing food production in school gardens. The Horticultural Division of the Food Production Department was represented by Mr. E. White and Mr. F. J. Chittenden, and the Board of Education by Mr. T. Johnson, H.M.I., and Mr. W. F. Spikes. Mr. H. G. Willink (Chairman of the Berkshire Education Committee) took the chair, and there were also present Mr. E. D. Mansfield (Vice-chairman of the Education Committee), Sir George Young (Headmaster of Bradfield College), and other members of the Berkshire Education Committee, and Mr. W. C. F. Anderson, Mr. C. C. Watkins (Director of Education for Buckinghamshire), Mr. H. E. Pugh (Secretary of Education Committee) and Mr. James (Horticultural Instructor in Reading University College). Sixty teachers from different parts of the county, all of whom cultivate school gardens, attended the Conference.

Mr. Willink, in opening the Conference, said that there are 53 school gardens in Berkshire, and that it is proposed to increase the number and extend the work in order that school gardens may do the utmost in their power to assist in food production. They recognised that the difficulties were great, but that the emergency was so urgent as to justify the greatest possible effort being made. Although the primary aim of school gardens is instruction, the problem before them was to combine this work with the largest measure of food production ; and the special task of the Conference was to consider the best means whereby instructions and production might go hand in hand.

Mr. E. White, on behalf of the Food Production Department, indicated the way in which that Department was doing all in its power to increase production by small cultivators as well as by farmers, and described briefly the work of the Horticultural Division of that Department. He also referred to the fact that the Board of Education was lending every assistance toward increasing the number of school gardens and providing the means of instruction for teachers in such gardens. In conclusion Mr. White expressed, on behalf of the Department, its recognition of the valuable work which the teachers of the country had done in promoting the work of food production.

Mr. Chittenden gave a valuable address on the means whereby production and instruction may be combined in school gardens. He pointed out that school gardens may be used for the purpose of raising crops of real food value without detriment to their main work of teaching the principles and practice of Horticulture ; and he commended the principle which has been adopted by the Berkshire Education Authority, of giving teachers a free hand, and allowing them either to lay out the gardens in separate plots or to arrange for collective cultivation or to combine both these methods. He emphasised the value of a demonstration and collective plot. He suggested, also, that teachers should cultivate those crops which come in early, but explained that in order to do so such plants as cabbage, if they are not to be obtained otherwise, must be raised under glass and hardened off and planted by the end of March. Similarly, spring onions can be had early ; in order to secure continued supplies late summer sowing for winter crops should be practised. He pointed out that such crops as parsnips, beets and carrots may be obtained for winter use from seeds sown in late summer.

With respect to the food value of different crops, he stated that first in order came the potato, followed by beet, and then by parsnip. He directed attention to the value of artichokes, principally because of their keeping qualities, and suggested that having regard to the difficulty of keeping onions until the spring, growers in the home counties would do well to grow leeks more widely than they have done in the past. Again, for winter use haricot beans stand high, and the Dutch brown bean (if seed can be obtained) should be grown.

Mr. T. Johnson, H.M.I., referred to the importance of economy in the use of seeds, and suggested that, where possible, the school garden should consist of no less than 25 rods. He added that although November is the best time for commencing the work of laying out and digging a garden, this work may be done, where necessary, so late as the middle of April. In this connection it may be worth mentioning that from actual trials which were made last year good crops of carrot, parsnip and potatoes were obtained from grass land turned up and planted so late as the middle of May. Needless to say, however, it is better to begin to prepare the land as early as possible.

THE following Memorandum (No. 11/C. 1), dated the 2nd January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Claims for Compensation.

Claims on Breaking up of Grass Land.—As already indicated in paragraph 9 of the Circular F.P. 123, dated 23rd October, 1917, the Defence of the Realm (Losses) Royal Commission are willing to reserve the rights of applicants for compensation arising out of orders for the breaking up of grass land until such time as the amount of direct and substantial loss incurred can be accurately ascertained, unless the applicant desires a hearing at the present time.

Where a present hearing is not desired, but the owner or tenant of the land desires to preserve his right to apply for compensation at some future time, a simpler form than that previously in use has been prescribed by the Commission. A copy of this form is attached.* The information asked for is reduced to a minimum, and there can be no difficulty in supplying it. It is not necessary to state the amount claimed. Each person who desires to put himself in a position eventually to apply for compensation should be given three copies of the form, and asked to fill up two and return them to the Executive Committee, retaining one completed copy for himself. The Committee should forward one completed copy to this Department together with a copy of the cultivation notice referred to and a copy of the record of the state of the land which has been prepared on their behalf; the other copy should be forwarded to the Secretary of the Commission without any additional documents.

Where the applicant desires a hearing at the present time, he should be asked to fill up in duplicate (according to the instructions already given) the printed form now in use for general cases; the application should be dealt with as indicated in paragraph 6 of this memorandum and a copy of the cultivation notice should be furnished.

Executive Committees should make their own arrangements for multigraphing the form sent herewith.

Claims for Loss of Rent.—Hitherto the Losses Commission have declined to deal with claims for loss of rent by a landlord where possession has been taken of any land in the occupation of a tenant, unless the tenancy has been determined In consequence, however, of representations made by this Department, the Commission have now expressed their willingnness to determine such a claim brought by the landlord, in any case in which the tenant signs a request that the rent for the land of which possession has been taken (be it the whole or a part of his holding) shall be paid to the landlord. If the tenant does not acquiesce, the Commission will not award any sum for loss of rent in his favour, unless he produces the landlord's receipt for that sum.

Any landlord, therefore, who desires to apply for compensation for loss of rent should be asked to obtain a written request as above from the tenant in question, and to attach the same to his application. It should be forwarded to this Department in due course with the application.

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* Not here printed.

Loss of Crops.—Where possession has been taken of land by Agricultural Executive Committees it should be noted that the Defence of the Realm (Losses) Royal Commission will not ordinarily consider a claim for compensation which is based upon the ground that a crop has been lost by the dispossessed occupier, or which asks for the estimated value of the crop to be paid to him.

(NOTE.—This does not apply where the crop is practically mature at the time of taking possession; but such cases will not often arise under Regulation 2M.).

The Commission have adopted the following principles for dealing with claims of this kind:—

Farm land in the ordinary course produces to the occupier so much profit That profit may ordinarily be estimated as equivalent to the true rental value The true rental value is not necessarily the same as the rent actually paid, which may be below, or even above, the fair rental value, although the rent usually affords some guidance in arriving at the true rental value.

Consequently, where the whole of a farm is taken, the Commission endeavour to ascertain the true rental value, and allow for loss of profits the equivalent of one year's true rental value of the farm, in addition to an allowance of the actual rent that the occupier has had to pay to his landlord during the period of possession. If the circumstances are very special, the Commission may allow more than one year's true rental value as compensation for one year's loss of profits.

Farm land which was in the occupation of the owner when possession was taken will no doubt be similarly treated by the Commission who will ascertain for themselves what is the true rental value; although in such a case they will be without the guidance of a rent actually reserved by an agreement or a lease.

Again, where only a part of a farm is taken, the Commission endeavour to find what is the proper, fair and reasonable apportioned rental value; if the field taken is better than the average of the fields on the farm, then a rather higher value is apportioned to that field than to the rest of the farm. If the field taken is only an average field, the Commission take the average rental value of the farm. They then make allowances on the same basis as stated above.

A recent example may be of interest: Possession had been taken of a clover field on 7th April, 1917, and continued to Michaelmas, 1917. The field was part of a farm held by a tenant. The claim made was for the estimated value of the crop of clover at so many cwt. to the acre, and at so much per ton, less expenses; in other words, for the estimated net profits that the dispossessed occupier might have realised from the crop if he had remained in possession and had been able to take it.

The Commission declined to deal with the case on a valuation of this kind, but enquired of the witnesses on both sides as to the true rental value apportioned to this particular field, and made their determination on the basis of one year's true rental value for loss of profits *plus* six months of the apportioned rent of the field on account of the tenant's liability to his landlord for that period.

The principles upon which the Losses Commission act should be borne in mind, and where applications are made based upon the loss of crops the applicant or his valuer should be informed that the Commission will not determine the claim upon that basis. An opportunity should be given to the applicant to amend his claim, but in any case the report of the valuer appointed by the Executive Committee should proceed upon the principle above stated and not upon that of loss of crops, even if the claim is based upon the latter.

Tillages and Manures.—The Losses Commission do not, however, exclude the payment of compensation for tillages where the crop has been sown and not taken by the dispossessed tenant, or for unexhausted manurial values, etc., where these exist. These allowances are made in addition to the loss of occupation value estimated upon the principle above stated. Where there is a claim for tillages and manurial values the Executive Committee's valuer should deal with these item by item as indicated in the Circular F. P. 123.

Claims for Loss of Occupation Value—The Commission are desirous that where there is a claim for stock taken over, for unexhausted tillages or for other items generally classed as "outgoing valuation," any claim for loss of occupation value should be put in at the same time, in order that the Commission may decide upon the whole matter at one hearing. and thus save time and money both to the public and the particular applicant. Attention is invited to paragraph (4) of the Circular F. P. 123, in which it is pointed out that periodical payments on account of loss of occupation value will be sanctioned by the Commission.

Forwarding of Claims—Agricultural Executive Committees are urged to forward all applications for compensation with the required reports at the earliest possible moment in order that claims may be heard and payments made without any avoidable delay.

Instructions as to the manner in which the claims should be dealt with and forwarded will be found in the Circular F. P. 43, dated 1st May, 1917 (paragraph 8 of which is cancelled), and F. P. 123/124, dated 23rd October, 1917; and in a memorandum dated 1st October, 1917, the Committees were asked to send a duplicate of the application on receipt to the Secretary, Defence of the Realm (Losses) Royal Commission, 27, St. James's Place, S W. 1. In forwarding this duplicate, the original should be retained to be dealt with in the prescribed manner, and the Commission should be so informed.

THE following Order (No. 1257), dated the 11th December, 1917, has been made by the Food Controller:—

Potatoes Order, 1917: General Licence.

The Food Controller hereby authorises a sum not exceeding 10*s.* per ton in lieu of 5*s.* per ton to be charged for non-returnable bags on sales of potatoes to be consigned from Ireland to a destination outside Ireland.

THE following Order (No. 1327), dated the 24th December, 1917, has been made by the Food Controller:—

Potatoes Order, 1917: General Direction.

The Food Controller hereby directs every wholesale dealer on the occasion of any sale of potatoes by him to furnish a proper invoice to the purchaser.

Sales of Potatoes.

THE attention of the Food Controller has been drawn to the fact that many wholesale merchants dealing in potatoes do not furnish invoices showing the price at which they have sold potatoes to retailers. To ensure the carrying out of the Potatoes Order it is necessary for the retailer on demand to produce satisfactory evidence proving the cost of his purchase, and retailers should require to be furnished with invoices whether for cash or credit transactions. A general direction requiring such invoices to be furnished by wholesale dealers is being issued by the Food Controller, and any retailer who does not receive them should inform the Local Food Control Committee. (*Board of Trade Journal*, 27th December, 1917.)

Average Profits on Potato Sales.

THE attention of the Food Controller has been called to the fact that some wholesale dealers in potatoes are in doubt as to the profits which they may charge on potatoes which pass through more than one wholesale branch of the firm.

Lord Rhondda is advised that the transfer of potatoes from one branch of a firm to another branch, or from the head office of a firm to one of its branch establishments, does not constitute a sale The transferring branch or office can, therefore, neither take a profit under clause 32 of the Potatoes Order, 1917, nor bring the potatoes so transferred into account for the purpose of calculating average profits for the week under that clause. (*Board of Trade Journal*, 27th December, 1917.)

The British Onions Order, 1917.

AN Order (No. 1331), dated the 24th December, 1917, has been made by the Food Controller to the effect that:—

PART I.—DEFINITIONS AND RESTRICTIONS.

(1) *Definitions.*—In this Order—

"*British Onions*" means onions grown in the year 1917 within the British Islands, but it does not include pickled onions or onions sold cooked in the course of a catering business.

"*Regular Wholesale Dealer*" means a person who at the date of this Order is carrying on a business in the ordinary course of which he sells onions by wholesale in their natural state, and the successors in business of any such person.

"*Retail Dealer*" means a person who is for the time being registered under the Potatoes Order, 1917, as a retail dealer in potatoes.

"*Grower*" as respects any onions sold in the ground means the owner of them at the time when they are lifted.

"*A week*" means seven days ending with Saturday.

(2) *Onions only to be Sold by Authorised Dealers.*—(*a*) No person shall sell British onions by retail unless he is a retail dealer as defined by clause (1) of this Order.

(*b*) No person shall sell British onions by wholesale except a regular wholesale dealer or to a retail dealer, and no person shall buy British onions by wholesale except a regular wholesale dealer or retail dealer, and no wholesale dealer or retail dealer shall sell or dispose by wholesale of British onions purchased by him except in the ordinary course of his business as a dealer in onions.

(*c*) A seller of onions may, if he reasonably believes the same to be true, accept the written certificate of a purchaser that he is a regular wholesale dealer or retail dealer.

(*d*) For the purpose of this clause every sale of a quantity exceeding 7 lb. shall be deemed to be a sale by wholesale.

(*e*) Notwithstanding the provisions of this clause a grower whose whole crop of British onions does not exceed 10 cwt. may sell such onions by retail subject to the restrictions imposed by the subsequent clauses of this Order.

(3) *Purchases of Onions for Consumption limited to 7 lb. per week.*—

(*a*) No person (except a regular wholesale dealer or retail dealer purchasing for re-sale) shall in any week directly or indirectly purchase a greater total quantity of British onions than 7 lb. in all, and no British onions shall be purchased whether by one person or by several for consumption in any household in excess of a quantity of 7 lb. in all in any week.

(*b*) No retail dealer shall knowingly sell directly or indirectly to any one person in any week a greater total quantity of British onions than 7 lb. in all, and no retail dealer shall sell any British onions to a purchaser where he has reason to suspect that by such purchase sub-clause (*a*) of this clause would be infringed.

(*c*) For the purposes of this clause an institution or catering business, within the meaning of the Sugar Order, 1917, shall be deemed to be a household.

(4) *Accounts.*—Every grower and regular wholesale dealer or other person selling British onions by wholesale shall keep a regular and punctual account showing the particulars of all British onions bought or sold by him by wholesale, including the names and addresses of the vendor or purchaser as the case may be, and the amount purchased or sold and the price charged and shall, upon every reasonable demand, produce such account and all relevant documents to any person authorised to inspect the same by or on behalf of the Food Controller or any Food Control Committee.

PART II.—PRICES.

(5) *Retail Maximum Price.*—(*a*) The maximum price on the occasion of a sale of British onions by retail shall be at the rate of 3*d* per lb.

(*b*) No additional charge may be made for packages or for giving credit or for making delivery.

(6) *Grower's Maximum Price.*—(*a*) The maximum price on the occasion of a sale of British onions by the grower shall be at the rate of £15 per ton on the basis (i.) that the onions are either loaded by the seller into trucks at the seller's railway station or (at the buyer's option) into a ship or barge not less convenient to the seller; (ii.) that bags (if required) are supplied by the buyer; and (iii) that no commission is paid

(*b*) If the onions are sold on terms other than those mentioned in sub-clause (*a*) of this clause a corresponding variation shall be made in the maximum price, and in particular if bags are provided by the seller the price per ton may be increased by a sum not exceeding 10s. whether the bags are returnable or not, and if any such commission is paid as is authorised by clause 8 of the maximum price and terms of sale shall be varied as mentioned in that clause.

(7) *Wholesale Dealer's Maximum Price.*—(*a*) The maximum price on the occasion of any sale of British onions other than a sale thereof by the grower or a sale by retail shall be at the rate of £19 per ton, on the basis that the onions are delivered *ex* warehouse or market at the sellers' customary place of sale and that bags are provided by the seller

(*b*) If the onions are sold on terms other than those mentioned in sub-clause (*a*) of this clause, a corresponding variation shall be made in the maximum price, and in particular if bags are provided by the buyer the maximum price per ton shall be reduced by a sum of 10*s*

(8) *Commission Sales*—(*a*) Where a grower sells onions grown by him direct to a retail dealer through the agency of a regular wholesale dealer at a commission, he may add the amount of the commission to the price authorised by clause 6, not exceeding the amount provided for by sub-clause (*b*) of this clause

(*b*) Where a commission is paid under sub-clause (*a*) of this clause the seller shall be bound to deliver the onions to the purchaser's railway station, or (if more convenient to the seller) to the purchaser's place of retail sale, and may add to the maximum price authorised by clause 6 any railway or canal charges so incurred, but the total amount added to the price per ton under sub-clauses (*a*) and (*b*) of this clause shall not together exceed £3 10*s*. per ton if bags are provided by the purchaser, or £4 if bags are provided by the seller.

PART III.—GENERAL.

(9) *Contracts.*—Except in such cases as the Food Controller may otherwise determine and except in respect of onions delivered prior to 31st December, 1917, all contracts subsisting at the date of this Order for the sale of British onions are cancelled.

(10) *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

(11) *Title and Commencement.*—(*a*) This Order may be cited as the British Onions Order, 1917.

(*b*) Part II of this Order shall come into force on the 14th January, 1918, but otherwise the Order shall come into force on 31st December, 1917.

THE Food Production Department of the Board have issued the following Notice (No. 6/S. 2), dated the 3rd January, 1918:—

Scheme for the Distribution of Seed Potatoes for Planting in 1918.

County Agricultural Executive Committees are reminded that where they purchase seed potatoes from the Food Production Department for distribution in their areas it is necessary for them to obtain a certificate of registration as retail dealers in seed potatoes from the Director of Vegetable Supplies, Ministry of Food, 18, Upper Grosvenor Street, London, W.1.

The President of the Board of Agriculture and Fisheries makes the following announcement:—

Feeding of Poultry.

Under Orders made by the Food Controller the use for the feeding of animals and poultry of wheat, rye, barley and rice which are fit for manufacture into flour for human food is prohibited. Mr. Prothero wishes to impress upon poultry keepers the necessity for strict compliance with these Orders. The continuance of the poultry industry under present conditions can only be justified if the feeding stuffs employed are such as are allowed by the Food Controller's Orders and are, in the main, unfit for human consumption.

Mr. Prothero warns poultry keepers that they must not rely on being allowed to continue to feed oats and maize to their birds. Poultry keepers should face the fact that for an indefinite period—certainly for some time after peace is declared—the reduced harvests of the world will leave very little grain available for poultry.

Should it become necessary later on to ration supplies of feeding stuffs for poultry, only the birds of proved utility could be recognised. The President of the Board of Agriculture and Fisheries therefore strongly advises all poultry keepers to dispose of poor layers and unnecessary cocks immediately.

In view of the shortage of dry chick food, poultry keepers should adjust their hatching operations to the amount of food suitable for rearing which they can secure.

Report of Committee on Production and Distribution of Milk.

THE Committee on Production and Distribution of Milk (on which are represented the Boards of Agriculture and of Local Government of England and Wales, of Scotland and of Ireland, as well as the Ministry of Food and the Labour Party, under the chairmanship of Major the Hon. W. Astor, M.P.) have just issued a second Interim Report.[*]

This Report deals in the main with (1) possible milk shortages, (2) the changing conditions of British dairy farming, (3) the preferential distribution of milk, and (4) the establishing of milk-collecting depots in dairy districts.

The Committee do not anticipate a milk famine this winter, though local shortages will occur. The adequacy of the milk supply being dependent partly on the supply and distribution of feeding stuffs and partly on the price which producers obtain, they recommended in June last[†] that the supply and distribution of concentrated feeding stuffs should be controlled, the War having reduced the actual and prospective supply of cake, offals, maize, etc., to a serious extent.

The Committee also recommended the admission of the prior claims of dairy cattle in the allocation of the very curtailed amounts of these feeding stuffs. They advised that owners of cows should, during the winter months, be entitled to a minimum daily allowance for each cow in milk of 2 lb. of cake and 4 lb. of offals or maize; and that town dairies with no land attached should be entitled to a minimum double ration of 4 lb. of cake and 8 lb. of offals or maize per cow per day.

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[*] (Cd. 8886), 1917.

[†] The first Interim Report of the Committee (Cd. 8608), 1917

They further recommended that an adequate supply of oats, beans and peas grown on the farm should, as far as possible, be left to stock owners.

They suggest that information as to the best and most economical methods of feeding cows under the present circumstances should be placed before farmers, and they believe that the Government policy of ploughing up grass land, by giving an increase in roots, straw and grain, will lessen the dependence of the dairy farmer on imported feeding stuffs; also, they hope that the fullest possible use will be made of manures suitable for grass land, so as to obtain improved pasture and better yields of hay next summer.

The Committee consider this winter's prices for producers fair, and they hope that the Food Controller will soon find it possible to lay down the guiding principles concerning milk prices for next summer and the following winter. They state that it would be in the interest of the consumer if, instead of having a flat rate for winter and summer milk, it became a recognised practice to charge a higher price in winter when the cost of production is high than in summer when it is low. They believe this would encourage winter milk production.

The problem of allocating supplies of milk, if the necessity arose, to different sections of the community was examined by the Committee, and after obtaining the views of various authorities and studying the scheme adopted in other countries definite recommendations are made as to priority classification and rations for the different groups

The Committee point out the need of preventing and reducing the existing loss of milk through souring and of dealing with milk which is produced in remote districts, and is used in butter-making and calf-rearing instead of in cheese-making. To attain these ends the Committee recommend the establishment of milk depots, where milk delivered from the farms may be properly chilled soon after milking and then forwarded to centres of population where it is required They note the almost universal adoption of pasteurisation as a means of improving the keeping qualities of milk collected at depots, etc., at present, and point out such milk is not sold as pasteurised milk, and that this treatment should never be regarded as a substitute for cleanliness in handling milk.

The depots recommended should be conveniently situated for the producers and with good communications to the cities.

The Committee are of opinion that a comprehensive scheme such as would be necessary to cover the country could only be completed after the War, but that, in certain districts, the loss of valuable food material accruing under the present methods of handling and utilising milk justifies and necessitates the initiation of such a scheme as a war measure.

Other advantages which would follow the establishment of such depots are :—

(*a*) Quantities of milk sent to towns would be regulated to meet the needs of retailers.

(*b*) The gross milk production of the country would probably be increased, as farmers would, through the depots, have a sure market for the whole of the milk they could produce at all seasons of the year.

(*c*) Surplus milk could be dealt with near the sources of production instead of in towns and cities, thus avoiding the risk of loss and the deterioration of this milk for cheese-making. Further, the whey would be available as food for pigs.

(*d*) Better hours could be obtained for the milkers.

In order to carry out this scheme, the Committee suggest two alternative methods, either through the Agricultural Organisation Society of the respective countries concerned, by means of Government loans repayable on easy terms, or by the Boards of Agriculture, as has been done in the case of the establishments for the drying and preserving of fruit and vegetables

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The Milk (Use in Chocolate) Order, No. 2, 1917.

AN Order (No. 1296), dated the 14th December, 1917, has been made by the Food Controller to the effect that:—

1. *Use of Milk in Chocolate*—No person shall after the 17th December, 1917, use in the manufacture of chocolate any milk, condensed milk, milk powder, dried milk or any other milk preparation except—

(i) Milk powder, condensed milk, dried milk, or any other milk preparation which he has in stock at the close of business on the 15th December, 1917, or which is in the United Kingdom on that day and then in course of actual transit to him ; and

(ii) Any other milk delivered to him before the 24th December, 1917.

2 *Contracts.*—Where the Food Controller is of opinion that a contract subsisting at the date of this Order, providing for the purchase of any milk, condensed milk, milk powder, dried milk or any other milk preparation was made for the purpose of using the article to be supplied in the manufacture of chocolate, he may, if he thinks fit, cancel or determine such contract or modify the terms thereof in such manner as he shall think fit.

3. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations

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The Ministry of Food and the 1918 Potato Crop.

IT is regarded by the Government as a matter of urgent national importance that every effort should be made to secure the largest possible acreage under potatoes in 1918. In order to further this object, Lord Rhondda, with the concurrence of the Board of Agriculture and Fisheries for England and Wales and of the Board of Agriculture for Scotland, makes the following announcement .—

With a view to encouraging the maintenance of the 1917 acreage under potatoes and the breaking up of further areas of grass land, the Food Controller will be prepared to enter into contracts with farmers for the delivery (as and when required) of approved varieties of main crop potatoes on the following special terms —

Time of Delivery.	*England and Wales.*	*Scotland.*
1st Nov., 1918, to 31st Jan., 1919	£6 f.o.r. (or f.o.b.)	£5 10*s.* 0*d.* f.o.r. (or f.o.b.)
1st Feb., 1919, to 31st Mar., 1919 ..	£6 10*s.* 0*d.* f.o.r. (or f.o.b.)	£6 f.o.r. (or f.o.b.)
1st May, 1919, to end of season ..	£7 f.o.r. (or f.o.b.)	£6 10*s.* 0*d.* f.o.r. (or f.o.b.)

The above terms will apply only to sound ware potatoes grown on acreage in excess of the total acreage under potatoes on the same farm or holding in 1916, and will be subject to the following special conditions:—

(*a*) The total acreage under potatoes on the farm or holding in question must not be less in 1918 than in 1917.

(*b*) Any directions issued by the Board of Agriculture regarding spraying, harvesting and pitting must be duly carried out.

(*c*) Applications for contract forms must be made not earlier than 1st February, 1918, and not later than 1st May, 1918, and should be addressed to the Director of Vegetable Supplies, 18, Upper Grosvenor Street, London, W. 1.

As from 1st November, 1918, the Food Controller will purchase the entire crop of Great Britain with the exception of—

(*a*) Potatoes grown on holdings including less than one statute acre of potatoes.

(*b*) Potatoes grown for the grower's consumption, or for consumption on the grower's farm

(*c*) Potatoes grown for experimental purposes.

The purchase price will be eventually assessed with due regard to the size of the crop and to the quality of the potatoes, but for sound ware will be in any case not less than the f.o.r. (or f.o.b.) prices indicated in the following scale:—

Time for Delivery.	*England and Wales.*	*Scotland*
November and December, 1918 ..	£5	£4 10*s.* 0*d.*
January and February, 1918 ..	£5 10*s.* 0*d.*	£5
March and April, 1919	£6	£5 10*s.* 0*d.*
May, 1919, to end of season ..	£6 10*s.* 0*d.*	£6

The prices for seed and undersized potatoes will be announced in due course; but every grower will have the right to retain any seed he may require for his own use.

The Food Controller as at present advised does not propose to take over or fix prices for the 1918 crop before 1st November If, however, for special reasons, *e.g.*, a partial failure of the crop or general shortage of food it becomes necessary in the national interest to fix any maximum prices, such maximum prices will not be less than those indicated below:—

1st to 15th July	£14 per ton.
16th to 23rd July	£12 ,,
24th to 31st July	£10 ,,
August	£8 ,,
September to October	£7 ,,

A separate announcement will be made at a later date as to the Irish crop.

The differential treatment given to Scottish potatoes reflects the desire of the Food Controller to relieve transport difficulties by putting the highest premium on the potatoes grown nearest to the principal consuming areas.

(*National Food Journal*, 9th January, 1918)

Base Prices for Potatoes.

THE Food Controller, in consultation with the three Departments of Agriculture, has fixed the following base prices under the Potatoes Order, No. 2, 1917, for sound ware potatoes delivered by the grower during the month of January, 1918 :—

England and Wales.

1. All counties except those mentioned in (2), £5 per ton
2. Yorkshire, Lincolnshire, Norfolk Cambridgeshire and Huntingdon :—
   - (*a*) For potatoes grown on silt lands, marsh lands, warp lands or limestone lands—
     - (i.) King Edward potatoes, £6 per ton
     - (ii.) Other varieties, £5 10*s*. per ton
   - (*b*) For potatoes grown on other lands :—
     - (i) King Edwards, £5 10*s* per ton
     - (ii.) Other varieties, £5 per ton

Scotland

3 (*a*) Dumbartonshire, Stirlingshire, Linlithgowshire, Edinburgh, Haddington and all counties south thereof, £5 per ton

(*b*) Argyllshire, Perthshire, Forfarshire, Kincardineshire, Fife, Clackmannan and Kinross, £4 15*s* per ton

(*c*) The rest of Scotland, £4 5*s* per ton.

Ireland

4. £4 per ton.

(*National Food Journal*, 9th January, 1918)

Inquiry into Conditions of Employment in Agriculture.

THE Board of Agriculture, for the information of the Agricultural Wages Board, are instituting a general inquiry throughout England and Wales, into the present conditions of employment in Agriculture. The inquiry will be conducted by 14 investigators, each of whom will be charged with the duty of collecting information within the area allotted to him, and of presenting a report to the Agricultural Wages Board. The scope of the inquiry is limited to those questions which necessarily arise in connection with the fixing of minimum wages, such as present rates of wages for time and piece-work, benefits and advantages given as supplementary to cash wages, hours of labour, rents and tenure of cottages, and economic conditions of farm workers generally. No official information on a comprehensive basis has been obtained for many years, and it is necessary, therefore, that the Wages Board should be placed in possession of a general survey of present conditions, which will materially assist them in considering in a broad spirit the recommendations which will in due course reach them from the 39 District Committees throughout the country.

District Wages Committees.

UNDER the provisions of the Corn Production Act the Agricultural Wages Board is charged with the duty of determining the areas for which District Wages Committees in England and Wales are to be established. The Board has now settled the areas as follows :—

1. Northumberland and Durham.
2. Cumberland, Westmorland and Furness District of Lancashire.
3. Lancashire (excluding the Furness District).
4. Yorkshire.
5. Lincolnshire.
6. Cheshire.
7. Derbyshire
8. Nottinghamshire.
9. Shropshire.
10. Staffordshire.
11. Leicestershire and Rutland.
12. Herefordshire.
13. Worcestershire.
14. Warwickshire.
15. Northamptonshire (including the Soke of Peterboro').
16. Cambridgeshire (including Isle of Ely), Huntingdonshire and Bedfordshire.
17. Norfolk.
18. Suffolk.
19. Essex.
20. Buckinghamshire.
21. Oxfordshire.
22. Gloucestershire.
23. Wiltshire.
24. Berkshire.
25. Middlesex and Hertfordshire.
26. Surrey.
27. Kent.
28. Sussex.
29. Hampshire (including the Isle of Wight).
30. Dorsetshire.
31. Somersetshire.
32. Devonshire.
33. Cornwall.
34. Glamorgan and Monmouth.
35. Pembroke, Carmarthen and Cardigan.
36. Radnor and Brecon.
37. Anglesey and Carnarvon.
38. Denbigh and Flint.
39. Merioneth and Montgomery.

The county in each case is the geographical county, but where a part of a county is detached it will be included in the area of the District Wages Committee within which it is situated. The chief duties of a District Committee, in the first instance, will be to recommend to the Agricultural Wages Board the minimum rates of wages applicable to its area, to grant permits exempting non-able-bodied men from the provisions of the Act requiring wages to be paid at not less than the minimum rate; and to hear complaints and determine arrears under Section 6 of the Act in respect of workers employed on piece-work. A District Committee will be authorised to appoint sub-committees and to delegate certain of its powers to them.

The Milk (Amendment) Order, 1917.

AN Order (No. 1317), dated 21st December, 1917, has been made by the Food Controller to the effect that :—

1. *Milk to be Sold Retail by Measure.*—No milk shall be sold or offered for sale by retail otherwise than by Imperial measure.

2. *Additions of Colouring Matter Prohibited.*—No colouring matter shall be added to milk or cream intended for sale, and no milk or cream to which any colouring matter has been added shall knowingly be sold, or offered or exposed for sale.

3. *Addition of Water Prohibited.*—No water shall be added to milk intended for sale, and no milk to which any water has been added shall knowingly be sold, or offered or exposed for sale.

4. *Cans and Bottles.*—No person may use for the purposes of his trade or business any milk can, milk churn, or milk bottle which bears the name or trade name or the trade mark or trade device of some person other than himself or his employer, except with the consent of such person.

5. *Amendments of Milk Order*, 1917.—The Milk Order, 1917 (hereinafter called the principal Order), shall be varied and amended as provided by the subsequent provisions of this Order.

6. *Wholesale Sales by Persons other than Producers.*—(*a*) The following Clause shall be substituted for Clause 4 of the principal Order which is hereby revoked :—

Clause 4.—Where milk is sold wholesale by or on behalf of any person other than the producer the maximum prices chargeable shall until otherwise determined pursuant to this Order be as follows :—

(i.) In the case of milk delivered by the producer to or for the account of the buyer in accordance with the directions of the seller the rate shall until the end of March, 1918, be 1*d.* per imperial gallon higher than the rate (not exceeding the maximum price) payable therefor to the producer by the seller.

(ii) In the case of milk not so delivered the rate shall be 2*s.* per imperial gallon until the end of March, 1918.

(iii.) The rate mentioned in Sub-clause (ii.) of this Clause includes all charges for delivery to the buyer's railway station if the milk is carried by rail and for delivery to the buyer's premises if not so carried. If rail-borne milk is delivered by or at the expense of the seller to the buyer's premises the rate may be ½*d.* per imperial gallon higher than the rate so mentioned

(iv.) The rate mentioned in Sub-clause (ii.) of this Clause is fixed upon the basis that the cost of providing churns or other vessels is borne by the seller ; and where milk is not sold on this basis, then the rate shall be ascertained by deducting from the rate applicable under this Clause the sum of ½*d.* per imperial gallon.

(v.) Except in the cases to which Sub-clause (i.) of this Clause applies, no milk shall be sold by a person other than the producer of the milk sold except upon the terms that the milk is to be delivered by or at the expense of the seller to the buyer's premises or the buyer's railway station.

(*b*) The foregoing provision shall take effect in the area of a Food Control Committee notwithstanding that the committee shall have fixed a maximum price or prices for milk in excess of the price or prices permitted under the provisions therein contained but subject nevertheless to any future exercise by the committee of the power to vary a maximum price vested in the committee under the principal Order.

7. *Buyer's Premises.*—For the purposes of the principal Order as hereby amended the expression " Buyer's premises " shall not include any roadside collecting place for milk, or any other premises which the Food Controller shall in any particular case determine not to be buyer's premises for the purposes of the principal Order.

8. *Price to Institutions.*—(i.) Where milk is sold to an institution by any person (whether he be the producer of the milk sold or not) in a quantity of not less than 17 imperial gallons to be delivered in any one

day the maximum price shall be at the rate of 2*s.* 2*d.* per imperial gallon, including all charges for delivery to the buyer's premises, or the maximum retail price for the time being in force in the area in which the institution is situated, whichever be the less. Any other sale to an institution shall for the purpose of the principal Order be deemed to be a retail sale and the maximum price shall be determined accordingly.

(ii.) "An institution" shall mean a public or private hospital, sanatorium, convalescent or nursing home, workhouse, infirmary, asylum, corporation or company not established for purposes of trading or profit, a religious or charitable community, a residential school or college, and a canteen.

(iii.) A Food Committee shall have power with the consent of the Food Controller :—

(*a*) to apply the provisions of this Clause whether with or without modifications to a sale of milk to any body of persons which in the opinion of the Committee should be treated as an institution as defined ;

(*b*) to vary the provisions of this Clause in its application to any institution.

9. *Amendment of Clause* 9 (*a*) (*i.*) *of the Milk Order*, 1917.—Clause 9 (*a*) (*i.*) of the principal Order shall be amended by the substitution of the word "person" for the words "wholesale or retail dealer in milk."

10. *Small wholesale sales.*—Where a person who sells milk from a retail shop sells from such shop milk to a person buying for re-sale, the maximum price shall as to the milk so sold on any day be the maximum price applicable to sales of milk by retail in the area in which such shop is situate, if the quantity sold on that day to such person does not exceed 8 imperial gallons.

11. *Revocation of Clause* 6 *of the Milk Order*, 1917.—Clause 6 of the principal Order is hereby revoked as on the 31st December, 1917, but without prejudice to any proceedings in respect of any previous contravention thereof.

12. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

13. *Exceptions.*—This Order shall not apply to :—

(*a*) Condensed milk, dried milk or milk preparations ;

(*b*) Milk sold for consumption on the premises of the seller.

Note :—This Order came into force on the 31st December, 1917, and extends only to Great Britain.

AN Order (No. 1319), dated the 21st December, 1917, has been made by the Food Controller as follows :—

The British Cheese Order, 1917.

Pursuant to the British Cheese Order, 1917, the Food Controller hereby requires all makers of and dealers in cheese to make on the prescribed form a return showing their stocks of British cheese at the close of business on the 31st December, 1917, and such other particulars as are necessary to complete the form.

The return shall be made before the 6th January, 1918, to the Secretary, Ministry of Food (Statistical Branch), Palace Chambers, S.W. 1, from whom forms of return may be obtained.

No return is required from a person owning less than 4 cwt. of British cheese at the close of business on the 31st December, 1917.

Brewers' By-products for Dairy Cattle.

IN view of the urgent necessity for keeping up the milk supply of the country and of the shortage of feeding stuffs, the Food Controller impresses upon brewers and distillers in milk-producing districts the importance of utilising their by-products for the feeding of dairy cattle, and instructs them, when disposing of the same, to give dairy farmers the preference over other customers as far as is possible.

Distribution of Feeding Stuffs.

CLOSELY allied with the control of live stock, which is now being established through the Live Stock Commissioners acting on behalf of Lord Rhondda, in all districts of Great Britain, is the distribution of feeding stuffs. The census of cattle and sheep taken on the 2nd December, 1917, will supply the basis on which the available supplies of feeding cake are distributed among farmers

The Ministry of Food have now complete control over the nuts, seed and kernels which constitute the raw material of the margarine and allied industries, and of their by-products, of which oil cake is the most important from the farmer's point of view. By a series of Orders recently issued effective control is secured of the manufacture and supply of oil cake.

Lord Rhondda has adopted the principle that dairy cows have the first claim on cake, and that town dairy farmers should receive an allowance greater than dairy farmers in rural districts who have greater facilities for the provision of other foods Brewers and distillers in milk-producing districts are being urged to give dairy farmers the preference over other customers in the disposal of dry grains and other by-products of the brewing and distilling industries suitable for cattle food. In order to secure that the rationing of dairy and other stock shall be in accordance with the interests of agriculture a small technical committee of expert members of the Board of Agriculture, the Ministry of Food, and stock raisers, has been set up to consider rationing from the scientific side.

Just as in the distribution schemes for other scarce commodities, Lord Rhondda is making use of the normal channels of trade in the allocation of feeding stuffs, including cakes and meals, millers' offals, maize by-products and the by-products of the brewing and distilling industry, but the general control is, as in other instances, entrusted to an Advisory Committee sitting at the Ministry of Food under the direction of the Director of Feeding Stuffs.

On this committee the Ministry of Food, the Board of Agriculture, the various branches of the trade, and the farmers, are represented. At each of the four ports—London, Hull, Liverpool and Bristol—at which the greater part of the material is allocated, there is established a Port Feeding Stuffs Committee, and in every area of England and Wales a Provincial Committee, consisting of six trade members, four farmers and the Live Stock Commissioner for the area or his delegate, has been formed. An Order is to be made requiring importers or their brokers, manufacturers, wholesalers, and distributing dealers to be licensed, and supplies will be allocated in accordance with the requirements of the area as indicated by the results of the census for cattle. (*The National Food Journal*, 12th December, 1917.)

AN Order (No. 1316), dated the 21st December, 1917, has been made by the Food Controller to the effect that :—

The Cattle Feeding Stuffs (Committees) Order, 1917.

Part I.—Port Feeding Stuffs Committees.—1. There shall be constituted a Port Feeding Stuffs Committee for each of the five divisions mentioned in the First Schedule to this Order and bearing the name stated in such Schedule.

2. Each Port Committee shall, except in such cases as the Food Controller may otherwise determine, consist of either four or eight trade members, as the Food Controller shall from time to time decide, representing equally the interests of importers of cattle feeding stuffs, seed crushers, flour millers and distributing dealers in cattle feeding stuffs, and of such other persons as may from time to time be appointed by the Food Controller as additional members.

3.—(*a*) If any vacancy shall occur on a Port Committee by death, resignation or otherwise, the Committee shall, at their next meeting, subject to the approval of the Food Controller, fill the vacancy by appointing another member representing the interest which was represented by the member whose membership shall have ceased.

(*b*) The provisions of this Clause shall not apply to a person appointed by the Food Controller to be an additional member of a Port Committee.

4. A Port Committee, may, subject to the provisions of this Order and to any directions which may from time to time be given by the Food Controller, meet together for the dispatch of business, adjourn, and otherwise regulate their proceedings and the rights of voting at their meetings as they may think fit. The quorum necessary for the transaction of business may be fixed by the Committee and unless so fixed shall be three.

5. A Port Committee may appoint as Secretary a person approved by the Food Controller, who shall hold office during the pleasure of the Committee and whose remuneration shall be such as may be determined by the Committee with the approval of the Food Controller. The Committee may also, subject to the approval of the Food Controller, provide such offices and appoint such clerks and servants as may from time to time be requisite to carry out the duties entrusted to them.

Part II.—Provincial Feeding Stuffs Committees.—6. There shall be constituted a Provincial Feeding Stuffs Committee for each of the areas described in the second column of the Second Schedule to this Order, and bearing the name stated in the first column of such Schedule.

7. (*a*) Each Provincial Committee shall, except in such cases as the Food Controller may otherwise determine, consist of six distributing dealer members, four farmer members, and an *ex officio* member, and of such other persons as may from time to time be appointed by the Food Controller as additional members.

(*b*) The *ex officio* member shall be either the Live Stock Commissioner within whose area the Provincial Committee is situate or a person nominated by him with the approval of the Food Controller.

8. (*a*) If any vacancy shall occur on a Provincial Committee by death, resignation, or otherwise among the distributing dealer members of the Committee, the continuing distributing dealer members of the Committee shall, at the next meeting of the Committee, subject to the

approval of the Food Controller, fill the vacancy by appointing another distributing dealer to be a member of the Committee.

(*b*) If any vacancy shall occur on a Provincial Committee by death, resignation or otherwise among the farmer members of the Committee, the vacancy shall be filled by another farmer farming in the area of the Committee, appointed by the Food Controller, on the nomination of the Director-General of Food Production in the case of England and Wales, and of the Area Live Stock Advisory Committee in the case of Scotland.

9. A Provincial Committee shall hold meetings at least twice in every month, and at such other times as occasion may require, and all meetings of the Committee shall be held at their office, or such other places as they may from time to time determine, and subject as aforesaid at such dates and at such times as they may think fit.

10.—(*a*) Subject to any directions given by the Food Controller in the case of any Provincial Committee, the Committee shall, at their first meeting, elect one of their members to be Chairman until the first meeting of the Committee in November, 1918.

(*b*) At the first meeting of the Committee in November, 1918, and in every subsequent November, the Committee shall elect a Chairman for the ensuing 12 months.

(*c*) Any casual vacancy occurring in the office of Chairman shall be filled at the next meeting of the Committee, and the person elected to fill the vacancy shall hold office until the time when the person whose office he has filled would have gone out of office.

11. If at any meeting of a Provincial Committee the Chairman is absent, the members present shall choose one of their number to act as Chairman at that meeting.

12. The quorum necessary for the transaction of business by a Provincial Committee shall be such number, not being less than three, as may be fixed by the Committee.

13. Every question at a meeting of a Provincial Committee shall be decided by a majority of the votes of the members present and voting on that question, and in the case of an equality of votes, the Chairman or acting Chairman shall have a second or casting vote.

14. A Provincial Committee may, subject to the provisions of this Order, and to any directions which may from time to time be given by the Food Controller, meet together for the dispatch of business, adjourn and otherwise regulate their proceedings as they may think fit.

15.—(*a*) A Provincial Committee may appoint as Secretary a person approved by the Food Controller, who shall be a local auctioneer, or a local solicitor having agricultural connections or a like firm of auctioneers or solicitors or such other person as the Food Controller may approve, but no distributing dealer shall be eligible for the office of Secretary, except with the unanimous approval of the Committee. The Secretary shall hold office during the pleasure of the Committee, and his remuneration shall be such as may be determined by the Committee with the approval of the Food Controller.

(*b*) The Committee may, subject to the approval of the Food Controller, provide such offices and appoint such clerks and servants as may from time to time be requisite for carrying out the duties entrusted to them.

Part III.—General.—16. Except as otherwise specifically provided by this Order, every member of a Committee shall be appointed by the Food Controller.

17. Any member of a Committee may resign therefrom by sending to the Secretary of the Committee notice in writing of his desire so to do, and the Secretary shall forthwith notify the Food Controller of any resignation received by him.

18.—(*a*) The Food Controller may at any time revoke the appointment of any member of a Committee, and thereupon such member shall cease to be a member of the Committee.

(*b*) The Food Controller may also at any time revoke the appointment of any officer, clerk or servant of a Committee, and thereupon such officer, clerk or servant shall cease to be employed by the Committee.

19. The proceedings of a Committee shall not be invalidated by any vacancy in their number or by any defect in the appointment of any member of the Committee, or by reason of any member of the Committee not being properly qualified. If any question arises as to the qualification of any person for membership of a Committee in any capacity such question shall be determined by the Food Controller.

20. Minutes of the proceedings of every meeting of a Committee shall be kept in a proper minute book, and shall be signed by the Chairman of the next ensuing meeting, and when so signed shall be *primâ facie* evidence of the proceedings at that meeting. Copies of all minutes shall, immediately after the meeting to which they relate, be forwarded to the Food Controller, and also, in the case of the Port Feeding Stuffs Committee for Scotland, to the Chief Live Stock Commissioner for Scotland.

21. The powers and duties of a Committee shall be such as may from time to time be assigned to them by the Food Controller, and the Committee shall in the exercise of those powers and the performance of those duties comply with such directions as may from time to time be given by the Food Controller.

22. A Committee shall furnish such reports, returns, and information as may from time to time be required by the Food Controller.

23. Every Committee shall cause to be kept full and true accounts of all moneys received and paid by them. The accounts shall be open to inspection by any person authorised in that behalf by the Food Controller, and shall be audited as he may direct.

24. All expenses incurred by a Committee shall be defrayed in such manner as the Food Controller may from time to time determine, and the Food Controller may, if he thinks fit, prescribe different methods for defraying the expenses of Port Committees and Provincial Committees or of any different classes of such expenses.

25. If any difficulties arise with respect to the constitution of any Committee or otherwise in relation to the foregoing provisions of this Order, the Food Controller may do anything which appears to him necessary or desirable for the establishment of such Committee or otherwise for ensuring the full operation of this Order or of any subsequent Order relating to the constitution, powers and duties of a Committee.

26. The Food Controller may at any time, if he thinks fit, discharge any Committee constituted by virtue of this Order and appoint another Committee or body of persons or person to exercise and perform all or any of the powers and duties which may have been entrusted to the Committee so discharged.

Note :—This Order does not apply to Ireland.

First Schedule.

PORT FEEDING STUFFS COMMITTEE.

London Port Feeding Stuffs Committee.

Division of Committee.

London.
Surrey.
Sussex.
Kent.
Essex.
Suffolk.
Cambridgeshire.
Huntingdonshire.
Bedfordshire.
Middlesex.
Hertfordshire.
Buckinghamshire.
Berkshire.
Oxfordshire.
Wiltshire.
Hampshire.
Isle of Wight.

Bristol Channel and West of England Port Feeding Stuffs Committee.

Division of Committee.

Worcestershire.
Warwickshire.
Herefordshire.
Gloucestershire.
Somerset.
Dorsetshire.
Devonshire.
Cornwall.
Monmouthshire.
Glamorgan.
Carmarthenshire.
Pembrokeshire.
Cardiganshire.
Radnorshire.
Brecknockshire

Liverpool Port Feeding Stuffs Committee

Division of Committee.

Cumberland.
Westmorland.
Lancashire.
Cheshire.
Derbyshire.
Nottinghamshire.
Staffordshire.
Flintshire.
Denbighshire.
Carnarvonshire.
Anglesey.
Merionethshire.
Montgomeryshire
Shropshire

Hull Port Feeding Stuffs Committee.

Division of Committee.

Northumberland.
Durham.
Yorkshire.
Lincolnshire.
Norfolk.
Leicestershire.
Rutland.
Northamptonshire.

Port Feeding Stuffs Committee for Scotland.

Division of Committee.
Scotland.

Second Schedule.

PROVINCIAL FEEDING STUFFS COMMITTEES.

PART I.—ENGLAND AND WALES.

Name of Committee.	*Area of Committee.*
Newcastle	Northumberland and Durham.
Carlisle	Cumberland and Westmorland.
York	East and North Ridings of Yorkshire.
Leeds	West Riding of Yorkshire.
Lancashire	Lancashire.
Cheshire	Cheshire.
North Wales	Flintshire, Denbighshire, Carnarvonshire, Anglesey, Merionethshire, Montgomeryshire.

Name of Committee.	*Area of Committee.*
South Wales	Monmouthshire, Glamorgan, Carmarthenshire, Pembrokeshire, Cardiganshire, Radnorshire, Brecknockshire.
Birmingham	Warwickshire, Worcestershire and Herefordshire.
Shrewsbury	Staffordshire and Shropshire.
Derby	Nottinghamshire and Derbyshire.
Market Harborough ..	Leicestershire, Rutland and Northamptonshire.
Peterborough	Soke of Peterborough, Holland and Kesteven Divisions of Lincolnshire.
Lincoln	Lindsey Division of Lincolnshire.
Norfolk	Norfolk.
Cambridge	Cambridgeshire and Huntingdonshire.
Bedford	Bedfordshire.
Ipswich	Suffolk.
Chelmsford	Essex.
London (N.)	Hertfordshire, Middlesex, Buckinghamshire and London north of the Thames.
Reading	Oxfordshire and Berkshire.
Southampton	Wiltshire, Hampshire and Isle of Wight.
Gloucester	Gloucestershire.
Yeovil	Somerset and Dorsetshire
Devon	Devonshire.
Cornwall	Cornwall.
London (S)	Surrey, Sussex and the Metropolitan Boroughs of Wandsworth, Battersea, Lambeth and Southwark.
London (S.E.)	Kent and the Metropolitan Boroughs of Bermondsey, Deptford, Camberwell, Lewisham, Greenwich and Woolwich

PART II.—SCOTLAND.

Name and Headquarters of Committee.	*Area of Committee : The Counties or Islands of*
South-Western—Dumfries	Dumfries, Kirkcudbright, Wigtown
South-Eastern—Edinburgh	Linlithgow, Midlothian, East Lothian Peebles, Roxburgh, Berwick, Selkirk.
Western—Glasgow ..	Lanark, Renfrew, Dumbarton, Argyle Bute.
North-Eastern—Aberdeen	Elgin, Banff, Aberdeen, Kincardine, Orkneys, Shetlands.
Central—Perth	Perth, Fife, Forfar, Clackmannan, Kinross, Stirling.
Northern—Inverness ..	Sutherland, Caithness, Ross, Inverness, Nairn.
Ayrshire—Ayr .. .	Ayr.

AN Order (No. 1248), dated the 10th December, 1917, has been made by the Food Controller as follows :—

Pigs (Maximum Prices) Order, 1917: General Licence.

The Food Controller hereby excepts from the operation of the above Order sales and purchases of (*a*) breeding sows, and (*b*) small pigs weighing at the time of sale less than 30 lb. live weight, which are bought for store purposes.

This licence shall come into force on the 16th December, 1917.

THE following message was issued by the Prime Minister on 1st January, 1918, to all agricultural labourers :—

A Message from the Prime Minister to all Agricultural Labourers.

I ask all workers on the land to do their very utmost to help to grow more food.

There is a shortage of food all over the world, and we may have to feed our Army and Navy, as well as ourselves, on what we can grow at home. They cannot fight on unless they are properly fed.

Every full day's work that you do helps to shorten the War, and brings peace and victory nearer.

Every idle day and all loitering lengthen the War and lessen the chance of victory.

Your comrades in the trenches are under fire every hour of the day and night. Will you not help them to win by working an extra hour each day ?

That is the way in which you can beat the Germans !

(Signed) D LLOYD GEORGE.

AT the request of the Flax Control Board the Board of Agriculture and Fisheries will endeavour to make arrangements for an extension of the cultivation of flax in this country during 1918, and for dealing with the resulting crop. For this purpose the Board have constituted temporarily a special branch, entitled the Flax Production Branch, and have appointed Mr. W. Gavin to be Director of Flax Production, Mr. Alfred Wood, F.C A , Secretary to the British Flax and Hemp Growers' Society, to be Assistant Director, and Dr. J. Vargas Eyre to be Technical Adviser.

Flax Production Branch of the Board.

The Board have further appointed the following Committee to assist the Board in the carrying out of such extended measures of flax production as requirements arising from the War may render necessary :—

Mr. P. Middleditch (*Chairman*).
,, W. Norman Boase.
,, H. I. Bowring.
,, J. G. Crawford.
,, H. E. Dale.
Captain R. Williams Ellis
Mr. R. Foster.
,, W. Gavin.
,, A. C. Gould.
,, P. Guedalla.
Mr. A. G. Lupton.
,, James Mackie.
Dr. R. S. Morrell.
Mr. W. M. Oliver
,, Wyatt Paul.
,, J. S. Pratt.
,, C. Coltman Rogers.
, W. S. Sykes.
,, T. A. Wilson
,, A. E. Wheeler.

Mr. Alfred Wood has been appointed Secretary to the Committee.

The address of the Flax Production Branch is 14, Victoria Street, London, S.W. 1.

AN Order (No. 1299), dated the 14th December, 1917, has been made by the Food Controller to the effect that:—

The Live Stock (Restriction of Slaughter) Order, 1917.

1. *Slaughter of Pregnant Animals.*—No in-pig sow of any age, in-lamb ewe of any age, in-calf cow, or in-calf heifer shall after the 15th December, 1917, be slaughtered or caused or permitted by its owner to be slaughtered.

2. *Slaughter of Calves.*—(*a*) After the 1st January, 1918, a heifer calf and after the 15th March, 1918, a male calf shall not be slaughtered or caused or permitted by its owner to be slaughtered.

(*b*) This clause shall not apply to:—

(i.) male calves of the Ayrshire breed born in Scotland; or

(ii.) the slaughter of a calf which has been marked by a person authorised by the Food Controller in that behalf in the manner prescribed by this clause and which bears such mark at the time of slaughter.

(*c*) The prescribed mark shall be a broad arrow branded in hot pitch or a mixture of hot pitch and tar on the back of the calf midway between the hips, the shaft and two barbs of the arrow to be a ¼ in. in width and the length of the shaft and of the barbs (outside measurement) to be 2½ in., or such other mark as may from time to time be prescribed by the Food Controller.

3. *Unauthorised Marking Prohibited.*—No person shall mark any calf with the prescribed mark or with a mark colourably resembling the prescribed mark unless he be authorised in that behalf by the Food Controller.

4. *Exemption from Restriction of Slaughter.*—The restriction of slaughter imposed by this Order shall not apply to:—

(*a*) Slaughter of an animal under the powers conferred by the Diseases of Animals Acts, 1894 to 1914, or any Order made thereunder; or

(*b*) Slaughter of an animal when such slaughter is immediately necessary or desirable on account of accidental injury to the animal or of its illness; or

(*c*) Slaughter of an animal if in the opinion of a person authorised in that behalf by the Food Controller the slaughter is desirable for any exceptional reason or purpose.

5. *Provision for Entry.*—For the purpose of executing and enforcing this Order any officer or other person authorised by the Food Controller may enter into any slaughterhouse or other premises on which he suspects animals are being or have been slaughtered for human food and examine any animals or carcases or hides therein and inspect and require production of any books or other documents relating to animals slaughtered on such premises; and no person shall impede or obstruct such officer or other person in the exercise of his powers under this clause.

6. *Veal.*—No meat obtained from any calf born in the British Islands shall, after the 1st January, 1918, be sold, supplied, or offered or exposed for sale for human consumption, except for the purpose of making or as an ingredient in a sausage, meat pie or similar article.

7. *Lamb.*—No meat obtained from any lamb born in the British Islands shall, after the 1st February, 1918, and before the 15th June, 1918, be sold or supplied or offered or exposed for sale for human consumption.

8 *Penalty*—Infringements of this Order are summary offences against the Defence of the Realm Regulations

9 *Interpretation*—For the purpose of this Order "Calf" means a bovine animal in which the first permanent molar or grinder tooth is not cut and visible

Regulations as to Dealings in Live Cattle and Dead Meat.

THE following Notice has been issued by the Ministry of Food:—Following the Meeting of the Central Advisory Committee on Live Stock and Meat Supplies held on Friday, 21st December, it has been decided by the Ministry of Food that the following regulations shall be observed in England, Scotland and Wales, in regard to dealings in live cattle and dead meat on and after the 27th December, 1917

1 It has been laid down by Order of the Food Controller* that no cattle may be bought for slaughter on and after 27th December, except at markets.

2 Licensed Live Stock Auctioneers and Cattle Salesmen selling cattle for slaughter on commission are required in England and Wales to join the Local Auctioneers' Committees, set up under the Army Cattle Purchase Scheme, and are required to act under the directions of the existing Chairman of those Committees

3 All cattle for slaughter will be valued at the markets or other authorised collecting centres by Grading Committees appointed by the Area Live Stock Commissioner or by a person authorised to act in place of a Grading Committee

4 The maximum prices payable to the farmer are as follows —

Bulls Bullocks and Heifers

1st grade	56 per cent	and over	75*s* per cwt
2nd ,	52	to 56 per cent	70*s*
3rd ,,	48 ,	,, 52 ,,	65*s*
4th	under 48 per cent		

Cows

1st grade	52 per cent	and over	70*s* per cwt
2nd	46 ,	up to 52 per cent	62*s* ,
3rd ,	42 ,	, 46 ,,	53*s* ,
4th ,,	under 42 per cent		

Inferior cattle and all saleable cattle manifestly diseased will be placed in the 4th grade and valued accordingly

The percentages shown above may be modified if, in the opinion of the Grading Committee, a beast is likely to yield an unusually small or large proportion of bone

5 The above prices are nett to the farmer, who must not be charged any commission or market tolls or weighing charges These charges are provided for by the Ministry of Food through the Chairman of the Auctioneers' Committee

6. Wholesale meat salesmen selling on commission may make no charge for selling, but will be required to join a recognised Wholesale Meat Supply Association, from whom they will receive their commission

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* See Order No 1336 below

7. The cost of carriage by railway will be repaid to the person incurring such expenditure:

(1) On all cattle sent by rail to the market and sold for slaughter.
(2) On cattle for slaughter railed from the market to the place of slaughter, or to another market.
(3) On home-killed dead meat (excluding offals) railed to a wholesale or retail meat trader.

8. In order to provide for the payment of all the above charges, including repayment of railage, a flat rate of 30*s* per head will be added to the price to the buyer by the auctioneer or salesman, and remitted by him to the Chairman of his Committee.

9. Application for repayment of railage charges on live cattle should be made to the Area Live Stock Commissioner, provided that a railway receipt is attached to the claim for refund, and that the receipt has been endorsed, in the case of railage for live cattle by the slaughterer, with a certificate that the cattle in question have been slaughtered.

In the case of home-killed dead meat application for repayment of railage should be made to the Wholesale Meat Supply Association, a railway receipt being attached to the claim for refund. Only one such application will be admitted in respect of the same parcel of meat.

10. A limited number of cattle dealers who have been regularly supplying certain markets may obtain written permission from the Auctioneer member of the Grading Committees at such markets and, on production of such permission, will be allowed to take such cattle from any market in Great Britain at which there is a surplus available. They will act as Government Agents and be paid 5*s*. per head, in addition to the cost, by the auctioneer who grants the permission, when the cattle are delivered to him. Such cattle must be sold for slaughter at a sum not exceeding 1*s*. 2*d*. per lb. of the actual dressed weight of the carcase (being 1*s*. per lb. in respect of the dressed carcase and 2*d*. per lb. in respect of offals). In determining the weight of the dressed carcase the weight of all offals shall be excluded, and the weight of the dressed carcase shall be ascertained not less than twelve hours after slaughter. The permission granted under this clause may be withdrawn at any time by the Area Live Stock Commissioners.

The Cattle (Sales) Order, 1917.

AN Order (No. 1336) dated the 24th December, 1917, has been made by the Food Controller to the effect that:—

1. *Sales of Beasts to be made in Market.*—(*a*) No person shall on and after the 27th December, 1917, sell or buy or offer to sell or buy any beast for slaughter unless the beast is at the time of such sale or offer in a market.

(*b*) A beast shall be deemed to be bought for slaughter if it be slaughtered within 28 days of the purchase.

2. *Restrictions on Sales in Markets.*—No beast fit for slaughter shall on or after the 27th December, 1917, be sold in any market except in accordance with the following provisions:—

(*a*) The beast shall have been graded by a person authorised in that behalf by the Food Controller as belonging to one of the four classes mentioned in the Schedule to this Order;

(*b*) The price shall not exceed the maximum price ascertained on the basis of such grading in accordance with the provisions of the Schedule;

(*c*) The beast shall be sold only to a person who is authorised by the Food Controller to buy in a market beasts fit for slaughter.

3. *Determination of Questions.*—The determination of a person authorised in that behalf by the Food Controller shall be conclusive upon the question whether a beast is fit for slaughter and as to the weight and value of any beast.

4. *Directions as to Weighing.*—All persons concerned shall comply with any directions as to the weighing of any beast or any other matter connected with the ascertainment of the maximum price payable therefor which may be given for the purposes of this Order by any person authorised in that behalf by the Food Controller.

5. *Power to give Directions.*—The Food Controller may from time to time give directions as to the measures to be taken in relation to the ascertainment of the maximum price for any beast when he deems it is in his opinion expedient that a beast should be sold on a dead weight basis, or that for any reason the maximum price should be ascertained otherwise than in accordance with the foregoing provisions of this Order.

6. *Interpretation.*—For the purpose of this Order " beast " includes bulls, bullocks, cows and heifers. " Market " shall include fair, and any other place which the Food Controller shall determine to be a market for the purposes of this Order.

7. *Penalties.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

8. *Title and Extent of Order*—(*a*) This Order may be cited as the Cattle (Sales) Order, 1917.

(*b*) This Order shall not extend to Ireland.

SCHEDULE OF MAXIMUM PRICES.

Bulls, Bullocks and Heifers.

Grading.	*Price per cwt.*
1st grade, 56 per cent. and over	75*s*.
2nd ,, 52 ,, to 56 per cent.	70*s*
3rd ,, 48 ,, ,, 52 ,,	65*s*.
4th ,, under 48 per cent.	as valued.

Cows.

Grading	*Price per cwt.*
1st grade. 52 per cent. and over	70*s*.
2nd ,, 46 ,, up to 52 per cent.	62*s*.
3rd ,, 42 ,, ,, 46 ,,	53*s*.
4th ,, under 42 per cent.	as valued.

Inferior cattle and all saleable cattle manifestly diseased will be placed in the 4th grade and valued accordingly.

The prices shown above may be modified if, in the opinion of the person grading the beast, it is likely to yield an unusually small or large proportion of bone.

Revocation of Maintenance of Live Stock Order of 1915.

IN view of the issue by the Food Controller of an Order entitled the Live Stock (Restriction of Slaughter) Order, 1917 (printed above), restricting the slaughter of pregnant animals and of calves, the Board of Agriculture and Fisheries have made an Order, dated 2nd January, 1918, revoking the Maintenance of Live Stock Order of 1915,* the provisions of which have now, in effect, been embodied in the above-mentioned Order made by the Food Controller. It is provided that the revocation shall not affect the previous operation of the revoked Order or any licence granted thereunder, or any penalty or punishment incurred in respect of any offence committed against the revoked Order before the date of revocation (2nd January).

Maximum Prices for Live Stock, and the Restriction of Meat Supplies.

THE following notice was issued by the Ministry of Food on 19th December last :—

The Food Controller has given earnest consideration to the situation which has arisen in regard to meat supplies, owing to the present high prices of live stock as compared with the fixed maximum prices for meat, and took certain steps recently with the object of relieving the immediate difficulties of the situation.

The Ministry of Food, with the assistance of a strong Advisory Committee of representative farmers and meat traders, are as rapidly as possible completing the arrangements for bringing into operation a scheme for the fixing of maximum prices for the various grades of live stock and also for the better distribution of the meat supplies in the country. This scheme cannot, however, be brought into operation until some time in January, and accordingly the Food Controller has issued an interim Order limiting the prices which may be paid for live stock until the new scheme can be brought into operation. The price payable for any beast bought for slaughter must not exceed 1*s*. per lb., this being the dead weight maximum price fixed by the Meat (Maximum Prices) Order. A sum not exceeding 2*d*. per lb. on the weight of the dressed carcase may be paid for offals. If it should prove necessary, owing to short supplies, to obtain cattle from the farms, the Local Auctioneers' Committees under the Army Cattle Purchase Organisation will be utilised. Instructions will be given to these committees to pay for the cattle on the basis of the new graded scheme of prices to which allusion has already been made.

The following grades and prices (which are equivalent to the 1*s*. 2*d*. per lb. already mentioned) will apply, each with a maximum price for bulls, bullocks and heifers, and cows.

Bulls, Bullocks and Heifers.

	Per cwt.
1st grade—56 per cent. and over	75*s*.
2nd ,, —52 ,, to 56 per cent.	70*s*.
3rd ,, —48 ,, to 52 ,, ...	65*s*.
4th ,, —under 48 per cent	—

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* See this *Journal*, September, 1915, p. 591.

Cows.

		Per cwt.
1st grade	—52 per cent. and over	70*s*.
2nd ,,	—46 ,, to 52 per cent.	62*s*.
3rd ,,	—42 ,, to 46 ,,	53*s*.
4th ,,	—under 42 per cent.	—

Inferior cattle and all unsaleable cattle manifestly diseased will be placed in the 4th grade and valued accordingly. The percentage shown above may be modified if, in the opinion of the Valuation Committee, a beast is likely to yield an unusually small or large proportion of bone.

The interim Order further provides that from 27th December cattle shall only be sold at cattle markets except by licence given by or under the authority of the Food Controller. Powers are reserved to the Food Controller or Food Committees to make special regulations with regard to certain markets.

Lord Rhondda has further decided that there shall be instituted as from 1st January, 1918, one meatless day per week upon which meat, either cooked or uncooked, shall not be sold

As regards the limitation of sales of meat, the Meat (Restriction of Retail Sales) Order at present in force restricts the quantity of meat which a butcher may sell in the four weeks ending the 13th January to the quantity he sold in October last. It will, however, be necessary as from the 13th January, still further to restrict the retail sales of meat. It is proposed that the quantity of meat sold by butchers should be reduced by 25 per cent. from the amount sold by them in the October period. There is in normal years a heavy drop in meat consumption after Christmas.

As there seems to be some misunderstanding on the part of butchers and the public as to the powers of Local Food Committees in regard to maximum retail meat prices, Lord Rhondda desires it to be known that Food Control Committees have no power to raise these prices above the maximum limitation of 2½*d*. per lb., or 20 per cent of the wholesale maximum price prescribed by the Meat (Maximum Prices) Order, and in no case can Lord Rhondda agree to maximum prices being exceeded by butchers.

The Oats Products (Retail Prices) Order, No. 2.

AN Order (No. 1328), dated the 24th December, 1917, has been made by the Food Controller, in amendment of the Principal Order (No. 1157),* dated the 10th November, 1917, to the effect that:—

1. In Clause 1 of the Principal Order, the words "and the Counties of Northumberland, of Durham, Cumberland, Westmorland, Lancashire, Yorkshire and Cheshire" shall be deleted.

2. Copies of the Principal Order hereafter to be printed under the authority of H.M. Stationery Office shall be printed with the deletion provided for by Clause 1 of this Order and the Principal Order shall take effect as if it had been originally made with such substitution.

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* See *Journal*, December, 1917, p 1013.

Supplies of Oats.

THE following letter (No. 5/S. 2), dated the 1st January, 1918, has been addressed to the Secretaries of Agricultural Executive Committees by the Food Production Department of the Board :—

SIR,—I am directed to inform you that in view of the possible shortage of oats for spring sowing the Department have made arrangements to secure supplies from Ireland and the Isle of Man, which will be available from the middle of January, for the use of farmers.

In order to assure rapid and effective distribution through the established channels of trade it has been decided to offer the handling of these oats to selected approved agents who are corn dealers and also to the storage agents appointed by the Department to handle seed wheat.

The Department will be glad if your Committee will indicate those approved agents on the accompanying list* in the county who are corn merchants and are likely to be prepared to undertake the distribution of seed oats to farmers. The names should be submitted on the form provided for the purpose.

The varieties which the Department propose to offer are :—

(1) Black Tartarian from Ireland ;
(2) Varieties of White Oats, *e.g.*, " Abundance " from Ireland ;
(3) Varieties of White Oats from the Isle of Man.

The approved agent must be prepared to purchase and store not less than 4 tons of any one variety. He must be prepared to sell the oats to the farmer at cost price, plus a commission not exceeding 3*s*. per qr. of 336 lb. for cash transactions

Full particulars regarding the varieties available, prices and the method of procedure to be followed in obtaining supplies will be furnished to those approved agents selected by the Committee. It is most important that agents should be selected at once and that they should be prepared to take supplies as soon as they are available. The names of the existing storage agents appointed by the Department will be communicated to you shortly.

The enclosed form* duly completed should reach the Department by the 10th January, 1918, *at very latest.*

I am, etc.,

PERCY G. DALLINGER

For Director of Supplies.

The Meat (Maximum Prices) Order, No. 3, 1917.

AN Order† (No. 1418), dated the 22nd December, 1917, has been made by the Food Controller in amendment of the Meat (Maximum Prices) Order, 1917,† as follows :—

1. The Schedule to this Order shall, as from the 1st January, 1918, be substituted for the Schedule to the Principal Order which shall, as from that date be construed as if it had originally been made with such substitution.

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* Not here printed. † See *Journal*, September, 1917, p. 675.

SCHEDULE OF MAXIMUM WHOLESALE MEAT PRICES.

Beef and Veal. Price per stone.			Mutton and Lamb. Price per stone.		Pork. Price per stone.	
Home Killed.	Imported		Home Killed.	Imported.	Home Killed	Imported.
Carcase	Hind Qtrs.	Fore Qtrs.	Carcase	Carcase.	Carcase.	Carcase.
s. d.	s. d.	s. d.	s. d.	s. d.	s d	s. d.
8 0	7 8	6 4	8 8	7 8	9 6	8 6

NOTE.—In ascertaining weight the offals are to be excluded.

In the case of pork, other than imported pork, the maximum rate of 9*s*. 6*d*. per stone is applicable if the offals are not included in the sale, and the maximum rate shall be 6*d*. higher if the offals are included in the sale. In each case the weight of the offals shall be excluded in ascertaining the weight of the carcase.

The British Sheep Skins (Sale) Order, 1917.

AN Order, dated the 18th December, 1917, to come into force as from the 14th January, 1918, has been issued by the Army Council to the effect that :—

1. No person shall without a permit issued by or on behalf of the Director of Raw Materials purchase or sell any skins taken from sheep or lambs killed in Great Britain, provided that nothing in this clause shall refer to any butcher or to any person holding a licence issued under the Order made by the Army Council on the 21st September, 1917, under the said regulations and relating to sheep skins.

2. No person shall purchase any skins of the description aforesaid at auction except upon disclosing the name of the principal, if any, on behalf of whom such purchase is proposed to be effected, and after such disclosure the said skins shall not be sold to such person unless his said principal is a person holding a licence issued under the Order made by the Army Council on the 21st September, 1917, and relating to sheep skins. Skins of the description aforesaid shall be sold at the market at which they were offered for sale and not otherwise.

3. No person shall purchase any skins of the description aforesaid otherwise than to fellmonger them.

Soldier Labour for Tractors.

THE following Circular (No. 25/MI.), dated the 15th December, 1917, has been addressed to tractor representatives by the Food Production Department of the Board :—

SIR,—With reference to the Department's Memorandum of the 6th instant, Ref. 16/MI., regarding the supply of labour for tractors, it has been decided, in view of the fact that Ford Tractors are now reported to be leaving the works in the United States of America at the rate of fifty a day, to send a considerable number of soldiers from the distribution centres direct to tractor representatives, to undergo their entire training on the land. It is expected that the training of these men will not take more than six weeks. It is desired that each tractor representative will arrange to take immediately soldiers for training in this way with 50 per cent. of the tractors at present in the county ; this departure is not, however, to interfere with the training of such men as become available from the training schools, and tractor representatives must be prepared to accept men from the schools at short notice, and possibly at inconvenient times, a circumstance which is unavoidable since the men have to be sent out immediately their preliminary instruction is completed in order to make room for the succeeding class

The Department have instructed the commandant at the.......... ....distribution centre to place..........men at your disposal and you should apply for them forthwith. When the men have completed their training they may be retained by the tractor representative as "third men" pending the arrival of further tractors.

The Department may have to call upon tractor representatives to take a second lot of soldiers for direct training in the middle of February, but a further communication will be sent on the subject

A Memorandum regarding rates of pay is attached hereto

I am, etc.,
HUGH M. STOBART.
Director, Machinery Supplies.

ENCLOSURE.

Tractor Ploughmen: Payment of Learners and Spare Men.

SOLDIERS and civilians trained entirely by tractor representatives should be paid at the rate of 25*s*. a week for a month, without a proficiency bonus, but men from a training school should be paid at this rate for two weeks only. At the end of either period the men, if proficient, should be paid 30*s*. a week for the next two weeks, without bonus, and thereafter, 30*s*. per week and a bonus of 1*s*. per acre ploughed, the bonus on other operations being based on 1*s*. for every £ charged to the farmer. The payment of bonus is limited to 2*s*. an acre (or 2*s*. in the £ for operations other than ploughing) for any one tractor and plough. The division of this sum, if there are more than two persons employed, must be determined by the tractor representative.

Trained men instructing others should, as has already been laid down, be paid 10*s*. for each learner who is passed as efficient. Attention is specially drawn to this in the hope that every effort will be made to teach men quickly and well.

THE following Memorandum (No. 11/L. 2.), dated the 21st December, 1917, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Soldier Labour.

The following extract from a War Office Circular Letter, dated the 15th instant, is forwarded for the information of Agricultural Executive Committees :—

" With reference to paragraph 26 of A.C. I. 1155/1917, it has been found necessary to modify the arrangement by which farmers are at liberty to send soldiers back at a day's notice, as this was intended to apply more to men only sent out for a short time, such as at harvest time, and might entail considerable congestion at distribution centres if farmers started sending men in whenever there was a spell of bad weather which interrupted outdoor work.

" It has, therefore, been decided that, in the case of men who have been accepted by a farmer and retained more than 6 days, a fortnight's notice must be given in writing to the Agricultural Commandant of the Distribution Centre from which the man was sent indicating when it is wished that the man should be withdrawn and the grounds for doing so.

" This will not apply to men who are sent out for definite periods of under or up to one month, when it can usually be stated the date on which the man is to return.

" Exceptional cases may also arise which will make it desirable to withdraw a man at short notice, and Agricultural Commandants will, so far as possible, accept such men if due notice is given.

" In the same way a fortnight's notice should, if possible, be given to a farmer before a man is withdrawn for military reasons, and at the same time these reasons should be explained."

THE following Memorandum (No. 13/L. 1.), dated the 28th December, 1917, has been addressed to the Secretaries of the Agricultural Executive Committees in England and Wales by the Food Production Department of the Board :—

Extension of Leave to Serving Soldiers.

In exceptional circumstances, and on the recommendation of the Agricultural Executive Committee concerned, this Department are prepared to approach the War Office asking them to grant an extension of leave not exceeding one month to a serving soldier who, at the time of the application is on leave, and whose services are urgently required on the particular farm.

The War Office have, however, informed this Department that they cannot undertake to grant an extension of leave unless the application is received by them at least two days before the man's leave expires. Any application for an extension of leave must therefore be received in this Department at the latest, three clear days before the leave expires, as otherwise this Department will be unable to take any action with regard to the application.

This Department desire to take this opportunity of reminding agriculturists through the Committee that the fact that an application has been recommended for an extension of leave is no justification whatever for a soldier overstaying his leave unless he has received an intimation from the Military Authorities that his leave has been extended.

Drainage Work, Ditching, etc.

THE following Memorandum (No. 7/ L. 2), dated the 19th December, 1917, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

In view of the fact that a large number of unskilled soldiers are immediately available for agricultural work, Agricultural Executive Committees should arrange for their employment at once on drainage work, ditching, etc , as much work of this nature is urgently required to be done in every county. In any case in which an Agricultural Executive Committee consider that compulsory orders should be made to carry out work of this kind, the fear of lack of labour for the purpose need not deter them from making such orders, as the above source of supply can readily be drawn upon. If the numbers of soldiers required are not available at the distribution centre serving the county immediate application should be made to the Department, stating the additional number of men required, when arrangements will be made for their transfer from another centre.

Prices and Supplies of Agricultural Produce.

PART III. of the Agricultural Statistics for 1916, dealing with prices and supplies of corn, live stock, and other agricultural produce in England and Wales in 1916 has now been issued. (Cd. 8870, 1917, price 3*d.*)

In his report which prefaces the tables in this part, Mr. H. E. Dale arrives at 178 as the general index number of prices of produce sold off the farm in England and Wales in 1916, the average prices from 1906-8 being taken as the basal prices (= 100). The index number in 1915 was 138, so that prices increased 29 per cent. in 1916 over 1915. The most marked rise was in potatoes, which from 133 in November, 1915, rose to 335 in November, 1916. Of other commodities it may be said generally that corn stood, relatively to 1906-8, at a rather higher level than animal produce. Representing the average prices of farm produce in 1906-8 as 100, the prices in 1916 are given as follows : Cattle 174, milk 167, sheep 152, pigs 187, hay 178, wheat 206, barley 211, potatoes 256, poultry and eggs 152, fruit 152, wool 174, butter 144, oats 191, hops 166, cheese 157, beans and peas 179, vegetables 193.

Credit to Farmers.

THE Treasury have agreed to the extension of the Government guarantee in respect of loans to farmers—which was limited to the period ended 31st December, 1917—for a further period of twelve months from that date. The existing arrangements for dealing with applications for credit will therefore continue until further notice.

Bad Farming.

ACTING with the Executive Committees of the counties, the Food Production Department is making a determined effort to level up the standard of farming all over the country. To this end it has authorised the Executives to take possession of over 20,000 badly farmed acres of land which the Executives are now cultivating themselves, or have let to good farmers. Furthermore, arrangements have been made with landlords to get rid of bad farmers on 24,000 acres of land and to re-let to better farmers. Again, about 30 farmers have been prosecuted and fined sums ranging from £5 to £100 for neglecting to comply with Orders for improved cultivation. Last week nine Orders authorising landlords to determine unsatisfactory tenancies were made in respect of about 800 acres, and three Orders were issued by the Board direct determining the tenancies of nearly 600 acres.

Insect Pests of Basket Willows.

WITH reference to Figs. 1 and 2—Illustrations to show size of Willow Pests—which appeared following page 848 in this *Journal* for November last, the Board desire to say that the statements thereunder, "Each Fig. is twice the natural size" should read "Each Fig. is *one-half* the natural size," while the word "young," appearing in brackets in the description of the illustrations Nos. 2, 3 and 4 of Fig. 2 should be deleted.

The Board wish further to state that the photos of Figs. 3-8 are by Mr. J. Keys, whose name was inadvertently omitted.

Phylloxera in Italy.

WITH a view to controlling the spread of Phylloxera the Italian Government have by a Decree dated the 2nd September, 1917, prohibited the importation into Italy of all plants and of parts of living plants, and of vegetable or mixed manure, except in certain specified cases within the control of the Minister of Agriculture. Under powers vested in the Ministry they may, in accordance with regulations which may be considered necessary, import from abroad plants which are prohibited, for the use of Public Botanical Institutions, but only when the plants come direct from places in which vines are not cultivated at all.

The Decree contains 51 articles and, among other things, defines the powers of the Consulting Commission for Defence against diseases of plants in regard to Phylloxera, provides for the notification and inspection of infected areas and the formation of Anti-phylloxera Associations, and lays down penalties for any contravention of the provisions of the Decree.

Warning to Organisers of Pigeon Shoots.

THE following Notice was issued by the Press Bureau on 4th January:—

As further concerted attempts are likely to be made in the near future to reduce the number of wood pigeons, the attention of the public is again called to the fact that to shoot long distance carrier or homing pigeons constitutes a serious offence under the Defence of the Realm Regulations.

Organisers of pigeon shoots are requested to notify to the Officer Commanding, the Pigeon Service, General Headquarters, Home Forces, The Horse Guards, Whitehall, S.W. 1, the dates on which such pigeon shoots are to take place, in order that as far as possible Government pigeons may not be sent on training flights on those dates over the districts in question.

A wood pigeon on the wing can be easily distinguished from a racing or homing pigeon by the quicker strokes of the wings and the jerkiness of the flight. The racing or carrier pigeon is a smaller bird which flies more steadily and evenly with a slower and more regular beat of the wings. The colour of the wood pigeon is bluish grey or slate with a white ring round the neck. The colours of racing pigeons vary. In a few cases the colour is somewhat similar to that of the wood pigeon, but in other respects the resemblance between them is slight. Serious consequences have resulted in the past through the shooting of pigeons bearing important messages from ships, seaplanes and aeroplanes, heavy penalties being imposed on persons convicted of such offences.

Organisers of pigeon shoots should, therefore, call the attention of all persons taking part in them to the above warning.

THE following Memorandum (No. 12/L 2.), dated the 24th December, 1917, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Forage for Food Production Horses.

Arrangements have been made by which, where difficulty exists in obtaining corn and hay locally, Agricultural Executive Committees may draw rations for Food Production horses in their charge through the Army Service Corps by indenting on the Headquarters of the Command in which their county is situated. This privilege should not be used more than is essential from the points of view of efficiency and economy, and not more than a fortnight's rations should be drawn at one time.

It will be necessary that all requests to the Command for the issue of rations through the Army Service Corps should be made by one officer of your Committee only, and the Command should be informed at once of the name and address of the officer authorised by your Committee to sign such demands on their behalf.

Command Headquarters will arrange for an account to be rendered to the Executive Committee for the value of the rations.

The above arrangements will not apply to cases in which horses are on hire to farmers for one month or longer under Scheme A of F.P. 92, as such horses will continue to be fed by the person hiring them.

THE second meeting of the Agricultural Wages Board* was held on the 20th December, 1917, at 80, Pall Mall, London, S.W. 1, Sir Ailwyn Fellowes presiding.

The Second Meeting of Agricultural Wages Board.

On a report from the Committee appointed at the last meeting, the Board determined the areas for which District Wages Committees should be established, and also adopted recommendations as to the numbers of appointed and representative members respectively to serve on each District Committee. The number of District Committees was fixed at 39, the area of each being a geographical county except in a few cases where two or more counties are combined.

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* For Report of the first meeting of the Board, see *Journal*, December, 1917, p. 1047.

Committees, consisting in each case of four appointed members, four representatives of employers and four representatives of workers, were appointed to consider and report upon: (1) suggestions received as to the names of persons to serve as representatives of employers and workers respectively on each District Wages Committee; (2) the general principles which should be adopted as a basis for determining the value at which the rent of cottages should be assessed in connection with the payment of a minimum wage; and (3) the general principles which should be adopted as a basis for determining the value of allowances or benefits which may be reckoned in part payment of wages.

The Committee appointed to select the names of representative members to serve on District Committees was instructed to proceed on the basis that representative members of the Wages Board should be regarded as eligible to serve on District Committees, provided that not more than one representative of employers or workers respectively should be appointed on any one District Committee, and that no member should serve on more than three District Committees.

The Board considered the question of delegating powers and duties to District Wages Committees and of authorising District Committees to delegate powers and duties to sub-committees. It was decided to delegate to District Committees and to authorise District Committees to delegate to sub-committees, subject in each case to certain conditions as to review by the delegating authority, the power of granting permits of exemption under Section 5 (3) of the Corn Production Act and the power of hearing complaints and determining arrears under Section 6 of the Act in respect of workers employed on piece-work.

Prosecutions of Farmers under Statutory Rules and Orders.

Spalding.—Illegal profits amounting to £2,143 were alleged to have been made by Henry Thompson, farmer and potato grower, of Dawsmere, Holbeach, Lincolnshire, who was indicted at Spalding on 18 charges of selling potatoes at prices in excess of the permitted maximum. Thompson pleaded guilty on all the summonses and was fined £1,800 with the costs. On the sales of 500 ton of potatoes he had received prices from £12 to £16 per ton, as against the maximum of £10.

Doddington.—"We look to a big man in the potato world like defendant to set a good example in times of great emergency," said the solicitor for the Food Controller, in prosecuting George Thomas Butcher, of Doddington, Cambs, for exceeding the maximum potato prices. There were twenty-seven summonses against Butcher. Two others failed, and nineteen were withdrawn by the prosecution. The amount of the fines, with costs, totalled £1,400.

The prosecuting solicitor said that Butcher contravened the Orders repeatedly, in some instances selling to big merchants. He did it with eyes open and put the money in his pocket, securing illegal profits at a time of national stress, which was a shameful thing for such a prominent man to do. On permitted dealer's prices the illegal profits were £542, and, including the cases withdrawn, £823.—The defence contended that Butcher sold as a retail dealer, "whose position was undefined in the Order."

North Shields.—On twenty summonses charging him with having sold milk at a price exceeding 1*s.* 5*d.* per gallon, viz., 1*s.* 9*d.*, fines amounting to £40 were imposed on John Vert, Rake House Farm. On forty summonses John Potts, Preston Grange, was fined £80.

Ramsey.—A fine of £300, with 25 guineas costs, was imposed in a case of profiteering, where Horace Yeomans, of the George Hotel, had sold potatoes at prices by which his unlawful gains in three transactions had amounted to £224 12*s.* 10*d.* The defendant was granted a month in which to pay the penalty.

Clithero.—Kayley Jackson, farmer, Bolton-by-Bowland, was fined £15 for exceeding in two instances the maximum price of butter

Hamilton —Charged with having bought eight bullocks in Glasgow, and resold them in Wishaw, contrary to the Meat (Sales) Order of 31st May, 1917, John Brown, of Main Street, Wishaw, was fined £25, or 20 days' imprisonment. He pleaded that he had acted in ignorance of the regulations. The Sheriff said that people must make themselves familiar with any regulations issued which affected the business that they were carrying on It was a perfect scandal that a cattle dealer should go into the witness-box and say that he had never read this Order.

Spalding.—For neglecting to thatch a wheat stack, and thus causing a loss of grain equivalent to 792 quartern loaves, James Edward Ridlington, of Holbeach, was fined £20. It was pointed out that this waste destroyed a day's food of 6,366 children.

Bourne.—George Sommerfield, miller, Dyke, having ground for pig-meal wheat and barley that were fit for human food, was fined £25, with costs.

Grantham.—Fines were imposed as follows at Spittlegate on millers and farmers in connection with the use of good barley and wheat for stock-feeding:—William T. Rowbotham, miller, Ropsley, £30, with £6 6*s.* costs; Ralph H. Netherclift, miller, Colsterworth, £20, with £4 4*s.* costs; and Thomas Harrison, Miles Harrison, J. C. Abbott, William C. Nottingham, and William Weston, farmers, £5 each, with £1 1*s.* costs. Rowbotham remarked: "We will shut the mill up. That will have you."

Uckfield.—Luther Berry, Halland, was fined £30 for mixing with oats 42 per cent. of wheat fit for human food, and sending it to be ground for pigs.

Worksop.—Walter Beard, miller and farmer, was fined £23 for offences against the Flour Orders.—£10 for extracting only 48·5 per cent. instead of 71·25 per cent. of flour from an admixture of barley and wheat, and £1 each on 13 summonses for failing to make returns.

Scarborough.—Thomas Byass, corn dealer, was fined £20 for feeding pheasants with grain.

Woodbridge.—Thomas Boon, farm bailiff, who had scattered corn in a wood, was fined £10. (*The National Food Journal*, 12th and 26th December, 1917, and 9th January, 1918.)

NOTICES OF BOOKS.

International Year-book of Agricultural Legislation, 1916.—The International Agricultural Institute has just issued its sixth International Year-book of Agricultural Legislation. The volume contains some 1,500 pages written in French with an 81-page introduction in English, in which the general course of the legislation of the World in 1916 in connection with Agriculture is outlined, principally as affected by the conditions created by the War. The measures taken by these countries in regard to food-control in 1916 are described, and it is interesting to compare what the different countries had then done in this respect.

The body of this volume is divided into 11 sections giving account of the legislation in all the principal agricultural countries in the world affecting (1) agricultural and commercial statistics, (2) trade in agricultural products, machinery, manures and live stock, (3) finance and customs in relation to agriculture, (4) crops and vegetable products industries, (5) live stock breeding and animal products industry, (6) agricultural organisation and education, (7) plant diseases, weeds and plant pests, (8) agricultural co-operation, insurance and credit, (9) rural property and closer settlement, (10) relation between capital and labour in agriculture, and (11) rural hygiene and rural police.

There are two good indexes (in French), to the volume, arranged according to (1) country, (2) subject.

The price of the volume is 8*s*., or 2 dollars. Remittances should be forwarded to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

The International Year-book of Agricultural Statistics, 1907 to 1916.—This work is issued by the International Agricultural Institute. It runs to about 1,000 pages and gives, as in past years, detailed agricultural statistics for the different countries in the world. The statistics include yield, trade, and consumption, all during the last ten years, for the principal agricultural products, comprising, among others, cereals, potatoes, sugar, oilseeds, coffee, cocoa, cotton, rubber, textiles, tobacco, etc. Detailed international statistics respecting live stock, fertilisers, and chemical products used in agriculture are also a feature of this work.

There is also a special chapter reserved for the prices of the principal products enumerated, comprising quotations on spot, for forward delivery and futures, together with rates of ocean freight and of exchange.

The price of this volume is 8*s*., or 2 dollars. Remittances should be sent to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

Farm Records and the Production of Clean Milk at Moundsmere.—(London: "Country Life," Ltd., 15*s*. net., postage 6*d*.)

This is an interesting book dealing with two distinct subjects—farm records, and the production of clean milk—in which the author describes the method adopted by him in connection with a farm exceeding 1,000 acres in Hampshire. The records and illustrations will be found of particular interest to those farmers who desire to conduct their occupation on lines most approved in modern business.

Mr. Buckley does not claim that his methods are perfect, but he does show one system by which the farmer may form reasonably accurate conclusions as to the income and expenditure involved in each of the several departments of his undertaking.

The chapters on the production of clean milk describe how the milk produced at Moundsmere is obtained and dispatched for consumption in the best possible condition.

Mr. Buckley's practice in this department approximates the "ideal," and the more widely the chapters are read by milk producers the better will it be for consumers.

The profits on the book are to be given to the National Clean Milk Society.

Modern Sheep Farming.—James Long (London: "The Bazaar, Exchange and Mart" Office, 1s. net).

This little book deals in a concise manner with the breeding and rearing of sheep for mutton and wool. The opening chapter contains a comprehensive survey of the sheep industry in this country, while in subsequent chapters is given information on the flock in relation to the cultivation of the land, the characteristics of the various breeds, dipping and washing, foods and feeding, the management of the flock, and other essential points of the sheep industry.

The book is fully indexed, and contains a number of good illustrations.

Dairy Cattle Feeding and Management.—C. W. Larson and F. S. Putney. (New York: John Wiley & Sons; London: Chapman & Hall).—This work is a comprehensive treatise on the feeding and management of dairy cattle, and is designed specially for the use of students. It is intended to be supplementary to a course of lectures, the nature of which is indicated by the arrangement of the material in twenty-nine lectures. In order that the course may be made thoroughly practical a series of practical exercises is included in an appendix, which contains also various tables giving the composition, digestibility and relative nutritive values of a large number of feeding stuffs. The subjects dealt with include the principles of nutrition, feeding standards, selection of feeds, compounding of rations, systems of feeding, calf-rearing, feeding and care of heifer and sire, principles of breeding, veterinary hygiene, production of high-grade milk, milk-recording, cost accounting, construction and equipment of dairy barns, and the preparation of animals for show. In the treatment of the subject the results of the most recent scientific research are taken into account, and American experimental data are largely drawn upon for illustrative purposes. The text is accompanied by numerous tables and photographic illustrations which reproduce some of the main features of modern American dairying. A brief bibliography is appended to each lecture.

Demonstration of Agricultural Tractors and Ploughs.— Highland and Agricultural Society. (Edinburgh and London: Wm. Blackwood & Sons, 1917.)—The Directors of the Highland and Agricultural Society have just published an interesting Report on a Demonstration of Agricultural Tractors and Ploughs held by them in October, 1917, at the invitation of the Board of Agriculture for Scotland. Three separate demonstrations were conducted at centres in the neighbourhoods respectively of Edinburgh, Glasgow and Perth, and altogether twenty-nine tractors and a larger number of ploughs took part. The Report is divided into three parts—(1) General Arrangements and Committees, (2) Report by the Consulting Engineer, and (3) Report by the Committee of Official Observers. In the Report of the Consulting Engineer detailed particulars of all the tractors exhibited are given, with an illustration of each tractor, and special points of interest in connection with the different machines are noticed. The Official Observers in their Report make many useful observations and suggestions, which may be summarised as follows :—

Weight.—The weight of tractor should not exceed 30 cwt.

Horse-power.—Should be ample—not less than 20 B.H.P.

Caterpillars and Wheels.—Caterpiller tracks have not been shown to possess any advantage, in gripping power, over the best type of wheels.

Spikes, Bars, and Spuds.—Well designed spuds appear preferable to either spikes or bars.

Accessibility and Protection.—Working parts of machinery should be readily accessible. Complete protection against weather and interference should be provided.

Brakes.—Adequate brakes should be fitted.

Durability.—Exposed gear drives on wheel tractors, and excessive wear on caterpillar tracks, tend to impair durability.

Connections.—Spring attachment between tractor and plough desirable, with release device in case of severe shocks. Point of attachment should be variable vertically as well as horizontally.

Speeds.—2½ and 4 miles per hour forward, with reverse, appear to be most generally useful.

Fuel.—Complete vaporisation of paraffin does not appear to have been generally attained, and it may be found more satisfactory to use petrol when normal conditions return.

Handling and Turning.—Handling does not usually prove difficult. Single unit machines have the advantage that the implement operated is directly under the observation of the driver. Lighter tractors and single unit machines occupy less time and space in turning.

Price.—The price should not exceed £300.

Ploughs.—Must be adjustable to varying widths as well as to varying depths. Where the tractor and plough do not form a single unit, it is highly desirable that an automatic lift should be provided. Power lift has additional advantages. A guide wheel to regulate width of leading furrow is desirable. *Suggestions*—(1) A device for raising the last unit of the plough would enable, say, two furrows to be taken up-hill and three down ; (2) A one-way plough would abolish feerings and finishes, which, in most cases, must be done by horses.

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for December, 1917, issued by the International Institute of Agriculture, contains estimates of the production of cereal crops in the Northern Hemisphere. The countries in respect of which it is possible to give forecasts are as follows:—In *Europe*—Denmark, Spain, France, Great Britain, Ireland, Italy, Luxemburg, Norway, Netherlands, Sweden, Switzerland; in *America*—Canada, United States; in *Asia*—British India, Japan; in *Africa*—Algeria, Egypt, Tunis.

Wheat.—The total production in the above-mentioned countries is estimated to amount to 232,948,000 qr. in 1917, against 242,395,000 qr. in 1916, a decrease of 3·9 per cent., while the area sown was smaller by 5·2 per cent.

Rye.—In the above-mentioned countries in Europe and America, except Great Britain, the yield is placed at 18,685,000 qr. this year, against 19,420,000 qr. last year, a decrease of 3·8 per cent., but the area sown was larger by 7·1 per cent.

Barley.—The production in the specified countries, excluding British India, is estimated at 13,263,000 qr. in 1917, against 73,157,000 qr. in 1916, or an increase of 0·1 per cent., the area sown being greater by 6·3 per cent.

Oats.—The total yield in the specified countries, with the exception of British India, Japan, and Egypt, is placed at 280,085,000 qr. this year, or an increase of 12·1 per cent. compared with last year, when it amounted to 249,751,000 qr., while the area sown showed an increase of 8·7 per cent.

Maize.—The total production in Spain, Italy, Switzerland, Canada, United States and Japan is estimated to amount to 383,001,000 qr. in 1917, against 315,371,000 qr. in 1916, an increase of 21·4 per cent., the area sown being greater by 12·3 per cent.

Sweden.—According to a report dated the 2nd November, received from H.M. Minister at Stockholm, the final estimate of the harvest was as follows: Winter wheat, 2·3; spring wheat, 2·2; barley, 2·8; oats, 2·8; winter rye, 2·0; spring rye, 2·4; and potatoes, 3·7. (5 = very good, 4 = good, 3 = moderate, 2 = small.)

Canada.—The Census and Statistics Office at Ottawa, in a report dated the 16th November, states that the estimated area sown with autumn wheat on the 31st October was 710,000 acres, or 4 per cent. less than a year ago, and the condition of the crop was 80 per cent. as compared with 76 per cent. last year. Of the total land intended for next year's crops 53 per cent. is estimated to have been ploughed by 31st October.

United States.—According to a Report issued on the 19th December by the Bureau of Statistics of the Department of Agriculture, the estimated area sown with winter wheat is 42,170,000 acres, against 40,534,000 acres, the revised estimate of the area seeded last year. The condition of the crop on the 1st December was estimated at 79·3 per cent., against 85·7 per cent. last year. The acreage sown with rye is estimated at 6,119,000 acres, compared with 4,480,000 acres last year, and the condition of this crop is estimated at 84·1 per cent., against 88·8 per cent. a year ago. (*Broomhall's Corn Trade News*, 20th December.)

Live Stock in Brazil.—According to the census of live stock taken in 1916, the results of which have just been published, the number of each class of stock in the country has decreased since the previous census in 1912. The numbers are as follows (figures for 1912 being shown in brackets) :—Cattle, 28,962,180 (30,705,400) ; sheep, 7,204,920 (10,594,930) ; pigs, 17,320,210 (18,400,530) ; horses, 6,065,230 (7,289,690) ; mules and asses, 3,221,910 (3,234,880) ; and goats, 6,919,550 (10,048,570). (*Board of Trade Journal*, 27th December, 1917.)

Agricultural Conditions in England and Wales on 1st January.

THE Crop Reporters of the Board, in reporting on the crops and agricultural conditions on the 1st January, generally state that December proved, on the whole, very favourable for field work, being generally dry with light frosts until towards the latter half of the month, when frost and snow caused some delays, which were most severely felt in the south-east. Good progress was accordingly made everywhere, and in the chief corn-growing districts of the east work is at least as forward as usual, if not more so.

Nearly four-fifths of the area intended for wheat have already been sown, whereas at the same time last year only some two-thirds of the wheat area had been got in ; and the total area actually under wheat at the end of 1917 was fully 15 per cent. greater than a year ago. The young crop everywhere looks promising, although that sown late has received some check from the frosts. Of other autumn-sown crops the area under barley and oats is about the same as at this time last year, that under rye a little greater, and the bean area smaller. All these autumn crops are generally satisfactory.

Seeds are, in practically all districts with the exception of the eastern counties, where they are rather patchy, a strong and healthy plant.

Swedes are of good quality nearly everywhere, and this applies to turnips in some districts, but in others they are poor.

Reports on ewes are satisfactory, and they are in good condition. Other live stock are also healthy. In the eastern counties home-grown winter keep is rather scarce, but elsewhere the supplies are generally expected to be quite sufficient.

There has in most districts been sufficient labour for farmers to manage, with the assistance of soldiers and women; but skilled help is still scarce.

Agricultural Labour in England and Wales during December.

THE following local summaries give further details regarding agricultural labour in the different districts of England and Wales :—

Northumberland, Durham, Cumberland, and Westmorland.—Farmers are well on with their work, so that the shortage in the supply of labour in Northumberland and Durham is not much felt at present, and in Cumberland and Westmorland the supply is practically sufficient in most districts.

Lancashire and Cheshire.—The supply of labour is short, but soldiers and women have helped to make up the deficiency.

Yorkshire.—The labour situation is better than a year ago; the release of soldiers for work on the land has eased matters considerably, and there is now a fairly satisfactory supply, though in some districts there is still a shortage.

Shropshire and Stafford.—The supply is still deficient, but with the assistance of soldiers and women the position appears less acute.

Derby, Nottingham, Leicester, and Rutland.—The supply of skilled and casual labour is very short, but farmers are managing fairly satisfactorily with the assistance of soldiers and women.

Lincoln and Norfolk.—In some districts there is enough labour for present requirements, though temporary hands for special work are very scarce, but in most districts the supply of labour is deficient.

Suffolk, Cambridge, and Huntingdon.—In many districts the supply of labour is about sufficient for present requirements, except as regards temporary labour for threshing, but in other districts there is a shortage.

Bedford, Northampton, and Warwick.—With soldiers and women assisting, the supply of labour is about equal to present requirements.

Buckingham, Oxford, and Berkshire.—The supply of labour is deficient.

Worcester, Hereford, and Gloucester.—Generally labour is scarce, but there has been some improvement in the position, and soldiers and women have done good work.

Cornwall, Devon, and Somerset.—The supply of labour is still everywhere deficient, especially skilled men, but much assistance has been given by soldiers and women.

Dorset, Wiltshire, and Hampshire—Labour is still deficient, but the shortage has not been so much felt owing to the time of the year, and much assistance has been given by soldiers and women.

Surrey, Kent, and Sussex.—In some districts the supply of labour is sufficient for the time of the year. In others there is a shortage, especially of skilled men. As elsewhere, assistance is being given by women and soldiers.

Essex, Hertford, and Middlesex.—The supply of labour is still short, but with the assistance of soldiers the position is not acute.

North Wales.—The supply of labour is deficient, especially casual labour for threshing, etc., but the position is much eased by the release of soldiers to assist.

Mid Wales.—Though still in short supply, labour conditions are not so bad as a year ago, and work is not being much delayed by labour difficulties.

South Wales.—The supply of labour is very short throughout the division.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st January, 1918, certain diseases of animals existed in the countries specified:—

Austria (on the 28th November).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of September).—Anthrax, Swine Erysipelas.

France (for the period 18th November—1st December).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-scab, Swine Erysipelas, Swine Fever.

Germany (for the period 1st—15th December).—Foot-and-Mouth Disease, Glanders and Farcy, Pleuro-pneumonia, Sheep-pox, Swine Fever.

Holland (month of October).—Anthrax, Foot-rot, Swine Erysipelas.

Hungary (on the 28th November).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (for the period 26th November—2nd December).—Anthrax, Black-leg, Foot-and-Mouth Disease (947 outbreaks), Glanders and Farcy, Rabies, Sheep-scab, Swine Fever.

Norway (month of October).—Anthrax, Black-leg.

Spain (month of August).—Anthrax, Black-leg, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Tuberculosis.

Sweden (month of October).—Anthrax, Black-leg, Swine Erysipelas.

Switzerland (for the period 26th November—2nd December).—Black-leg, Swine Fever.

No further returns have been received in respect of the following countries: Belgium, Bulgaria, Montenegro, Rumania, Russia, Serbia.

AVERAGE PRICES of British Wheat, Barley, and Oats at certain Markets during the Month of December, 1915, 1916, and 1917.

—	WHEAT.			BARLEY.			OATS.		
	1915.	1916.	1917.	1915.	1916.	1917.	1915.	1916.	1917.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London ...	55 1	74 11	72 1	45 11	67 9	59 0	32 6	44 4	47 2
Norwich ...	52 11	72 6	70 10	47 0	65 7	57 9	30 8	44 10	43 0
Peterborough	53 2	72 8	70 9	47 5	66 3	58 7	31 1	46 2	42 4
Lincoln ...	53 10	73 1	70 10	47 1	66 9	58 5	30 8	46 1	43 0
Doncaster ...	53 10	72 2	70 11	46 9	65 3	58 3	30 2	45 10	41 9
Salisbury ...	53 0	73 11	70 2	48 9	66 5	58 10	31 1	44 11	41 10

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in December and November, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	DECEMBER.		NOVEMBER.	
	First Quality.	Second Quality.	First Quality.	Second Quality.
FAT STOCK :—	per stone.*	per stone.*	per stone.*	per stone.*
Cattle :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Polled Scots	21 7	20 3	18 3	17 6
Herefords	19 8	18 2	17 8	16 7
Shorthorns	19 8	18 2	17 10	16 4
Devons	19 4	17 9	17 9	16 1
Welsh Runts	20 0	19 4	17 5	16 9
	per lb.*	per lb.*	per lb.*	per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	16½	14¾	15¾	14
Sheep :—				
Downs	17¾	16¼	16¾	15¼
Longwools	17½	16	15¾	14¾
Cheviots	18¼	17	16¼	15
Blackfaced	17½	15¾	14¾	14
Welsh	17	15¾	15¼	14
Cross-breds	17¾	16¼	16½	15
	per score live wght.	per score. live wght.	per stone.	per stone.
Pigs :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Bacon Pigs	18 0	18 0	18 10	18 3
Porkers	18 0	18 0	19 3	18 6
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ *s.*	£ *s.*	£ *s.*	£ *s.*
Shorthorns—In Milk ...	55 14	44 4	50 11	39 14
,, —Calvers ...	49 15	39 16	46 17	38 2
Other Breeds—In Milk ...	54 12	43 14	51 8	37 3
,, —Calvers ...	33 0	30 0	32 0	28 0
Calves for Rearing	4 6	3 6	4 3	3 5
Store Cattle :—				
Shorthorns—Yearlings ...	17 11	14 18	17 0	14 11
,, —Two-year-olds...	27 10	23 4	26 19	22 19
,, —Three-year-olds	36 14	31 5	35 18	30 3
Herefords —Two-year-olds...	29 18	25 4	28 10	24 13
Devons— ,,	28 6	23 18	27 10	24 2
Welsh Runts— ,,	26 5	23 10	26 19	22 12
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Downs or Longwools ...	69 9	57 0	63 9	52 3
Store Pigs :—				
8 to 12 weeks old	35 0	26 0	36 8	26 10
12 to 16 ,, ,, ...	58 11	44 7	60 11	47 2

* Estimated carcass weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in December, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF :—						
English	1st	112 0	112 0	—	112 0	112 0
	2nd	—	111 0	—	—	107 6
Cow and Bull	1st	112 0	112 0	112 0	112 0	112 0
	2nd	105 0	107 6	93 6	105 0	107 6
Irish : Port Killed	1st	112 0	112 0	112 0	112 0	112 0
	2nd	—	111 0	—	—	107 6
Argentine Frozen—						
Hind Quarters	1st	107 6	—	—	—	—
Fore ,, ...	1st	88 6	—	—	—	—
Argentine Chilled—						
Hind Quarters	1st	107 6	107 6	107 6	107 6	107 6
Fore ,, ...	1st	88 6	88 6	88 6	88 6	88 6
American Chilled—						
Hind Quarters	1st	—	—	—	—	—
Fore ,, ...	1st	—	—	—	—	—
VEAL :—						
British	1st	112 0	112 0	112 0	112 0	112 0
	2nd	102 6	96 6	107 6	102 6	102 6
Foreign...	1st	—	—	—	—	—
MUTTON :—						
Scotch	1st	121 6	121 6	121 6	121 6	121 6
	2nd	—	116 6	—	—	112 0
English...	1st	121 6	121 6	—	121 6	121 6
	2nd	—	116 6	—	—	112 0
Irish : Port Killed	1st	121 6	—	121 6	121 6	121 6
	2nd	—	—	—	—	112 0
Argentine Frozen	1st	107 6	107 6	107 6	107 6	107 6
New Zealand ,, ...	1st	—	—	—	—	—
Australian ,, ...	1st	—	—	—	—	—
LAMB :—						
British	1st	—	121 6	—	—	—
	2nd	—	116 6	—	—	—
New Zealand	1st	—	—	—	98 0	—
Australian	1st	—	—	—	98 0	—
Argentine	1st	107 6	107 6	—	107 6	—
PORK :—						
British	1st	133 0	133 0	133 0	133 0	133 0
	2nd	—	—	—	—	—
Frozen	1st	119 0	119 0	—	—	—

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in December, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. *d.* per 12 lb.	*s.* *d.* per 12 lb.	*s.* *d.* per 12 lb.	*s.* *d.* per 12 lb.	*s.* *d.* per 12 lb.	*s.* *d.* per 12 lb.
BUTTER :—						
British	—	—	—	—	28 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery —Fresh	—	—	237 0	—	—	—
,, Factory	—	—	233 0	—	—	—
Danish...	—	—	—	—	—	—
French...	—	—	—	—	266 0	262 0
Dutch	—	—	—	—	—	—
Australian	252 0	—	—	—	—	—
Canadian	252 0	—	—	—	—	—
Argentine	—	—	—	—	—	—
CHEESE ;						
British—						
Cheddar	152 0	—	—	—	152 0	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	160 0	—	162 6	—
			per cwt.	per cwt.	per cwt.	per cwt
Canadian	130 6	—	130 6	—	130 6	—
BACON ;—						
Irish (Green)	182 0	—	181 0	—	182 0	—
Canadian (Green sides)	—	—	—	—	179 0	—
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	212 0	—
American (Green) (long cut)	170 6	—	170 0	—	171 6	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120
British...	—	—	—	—	44 7	40 0
Irish	35 9	—	36 3	34 10	37 6	35 6
Danish	—	—	—	—	37 6	34 6
American	25 10	—	24 0	23 1	24 9	23 9
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Edward VII.	147 6	136 0	126 6	121 6	141 0	130 6
Up-to-Date	144 6	133 6	120 0	113 6	143 6	130 0
Other late varieties ...	150 0	120 0	125 0	120 0	145 0	135 0
HAY :—						
Clover	—	—	—	—	143 6	136 0
Meadow	—	—	—	—	143 6	136 0

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	DECEMBER.		TWELVE MONTHS ENDED DECEMBER.	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	33	85	421	571
Animals attacked	38	112	480	687
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	24
Glanders (including Farcy):—				
Outbreaks...	—	2	24	46
Animals attacked	13	5	62	117
Parasitic Mange:—				
Outbreaks	394	253	2,596	2,147
Animals attacked ...	700	503	4,831	4,689
Sheep-Scab:—				
Outbreaks	96	177	543	424
Swine Fever:—				
Outbreaks	119	332	2,104	4,331
Swine slaughtered as diseased or exposed to infection	32	151	869	9,168

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	DECEMBER.		TWELVE MONTHS ENDED DECEMBER.	
	1917.	1916.	1917.	1916.
Anthrax:—				
Outbreaks	—	—	3	3
Animals attacked	—	—	5	7
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	1	—
Animals attacked	—	—	1	—
Parasitic Mange:—				
Outbreaks	4	2	45	61
Sheep-Scab:—				
Outbreaks	70	100	430	506
Swine Fever:				
Outbreaks	3	26	198	317
Swine slaughtered as diseased or exposed to infection	17	195	1,142	1,886

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1915, 1916 and 1917.

Weeks ended (*in* 1917).	WHEAT.						BARLEY.						OATS.					
	1915.		1916.		1917.		1915.		1916.		1917.		1915.		1916.		1917.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan. 6 ...	46	2	55	8	76	0	29	7	47	8	66	4	26	5	31	5	47	1
,, 13 ...	48	9	56	7	75	8	30	5	48	6	65	7	27	6	31	11	47	2
,, 20 ...	51	6	57	2	75	8	31	3	49	6	64	9	28	10	32	6	47	4
,, 27 ...	52	8	58	0	75	10	32	5	51	0	64	5	29	10	32	11	47	8
Feb. 3 ...	53	3	58	3	75	10	33	7	52	5	64	0	30	3	32	4	47	3
,, 10 ...	54	8	57	6	76	0	34	7	52	10	63	5	31	1	32	2	46	11
,, 17 ...	56	0	56	11	76	3	34	11	53	6	63	8	31	5	31	9	47	3
,, 24 ...	56	0	58	2	76	9	35	3	54	2	63	9	31	8	32	2	47	8
Mar. 3 ...	55	11	59	4	77	4	34	6	55	7	64	0	31	8	32	4	48	0
,, 10 ...	54	8	58	2	78	0	33	5	55	6	63	7	31	0	32	3	48	7
,, 17 ...	53	9	57	9	78	10	32	2	55	4	64	1	30	7	31	10	49	4
,, 24 ...	54	3	55	11	80	3	31	11	54	6	65	6	30	6	31	4	50	4
,, 31 ...	54	6	53	6	81	5	31	9	53	8	71	10	30	6	30	5	51	10
Apl. 7 ...	54	9	51	8	84	4	31	3	53	7	69	11	30	4	30	1	55	1
,, 14 ...	55	4	53	2	85	2	30	10	53	1	71	10	30	5	30	7	57	2
,, 21 ...	56	5	55	3	84	10	31	5	52	10	70	6	30	11	31	8	59	8
,, 28 ...	58	3	56	3	81	1	32	7	53	5	69	5	31	5	32	4	58	6
May 5 ..	60	5	55	7	77	7	33	3	53	1	64	4	32	4	32	10	54	9
,, 12 ...	61	7	55	5	78	0	34	0	53	5	64	11	32	5	33	1	55	2
,, 19 ...	62	0	55	0	77	11	34	1	52	10	64	10	32	8	33	0	55	2
,, 26 ...	61	11	54	7	78	0	34	8	52	9	64	9	32	7	33	4	54	11
June 2 ...	61	9	53	3	78	0	35	4	53	9	65	11	32	5	33	3	54	11
,, 9 ...	60	1	51	2	78	0	34	5	52	8	67	7	32	4	32	7	55	0
,, 16 ...	56	1	48	10	78	2	34	3	50	9	75	6	31	9	32	1	55	1
,, 23 ...	52	0	47	6	78	1	34	4	49	10	75	0	31	9	31	3	55	2
,, 30 ...	49	5	46	3	78	3	35	3	49	1	73	11	31	1	30	10	55	1
July 7 ...	50	1	46	3	78	1	34	7	45	6	69	5	31	6	30	8	55	2
,, 14 ...	52	7	48	11	78	2	35	8	47	5	70	10	31	6	31	6	55	1
,, 21 ...	53	10	51	6	78	3	35	10	48	8	72	1	32	1	32	3	55	2
,, 28 ...	55	3	53	5	78	3	36	1	47	2	65	7	31	1	32	5	55	2
Aug. 4 ...	55	4	55	1	78	2	35	7	46	1	73	6	31	5	32	9	55	0
,, 11 ...	55	2	56	7	78	4	37	0	46	11	76	1	31	7	31	2	55	0
,, 18 ...	54	3	58	1	78	7	39	4	48	0	68	11	31	4	30	8	55	6
,, 25 ...	51	11	59	0	76	7	38	3	47	1	70	7	30	0	31	6	54	7
Sept. 1 ...	45	3	59	4	72	1	38	1	48	5	60	4	26	10	30	5	49	0
,, 8 ...	43	0	59	3	71	6	37	11	51	7	59	3	26	8	31	1	46	7
,, 15 ...	42	9	59	11	70	7	39	0	52	6	57	2	26	4	30	9	45	0
,, 22 ...	43	3	59	4	70	8	39	8	53	3	56	10	26	1	30	9	45	8
,, 29 ...	43	5	58	10	70	6	40	4	54	1	58	5	26	5	31	1	44	7
Oct. 6 ...	44	1	59	2	70	8	41	0	54	5	57	9	26	5	30	9	44	9
,, 13 ...	45	9	59	7	71	0	42	3	53	10	58	5	27	1	31	6	44	5
,, 20 ...	48	2	60	9	70	8	44	0	53	8	59	3	28	1	31	11	44	1
,, 27 ...	50	3	62	10	70	10	46	2	54	6	60	1	29	1	32	10	43	0
Nov. 3 ...	51	6	66	7	70	4	47	3	56	2	59	11	30	4	34	0	42	4
,, 10 ...	52	8	69	8	70	3	47	5	58	0	60	2	30	11	35	8	42	1
,, 17 ...	53	6	70	9	70	3	47	11	59	8	60	2	31	3	37	8	43	10
,, 24 ...	54	2	70	8	70	2	48	7	61	8	59	9	31	1	39	7	43	1
Dec. 1 ...	53	7	71	3	70	2	48	11	63	1	59	3	30	11	41	4	44	6
,, 8 ...	52	10	72	1	70	7	47	10	65	6	58	7	30	4	44	1	43	5
,, 15 ...	53	11	73	2	71	2	47	5	66	5	58	0	30	6	45	10	43	6
,, 22 ...	53	10	74	8	71	1	47	2	67	3	57	7	30	7	46	5	44	2
,, 29 ...	54	9	75	10	71	1	47	5	67	5	57	7	30	10	47	4	44	10

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

CORN PRICES.

SEPTENNIAL, QUARTERLY AND ANNUAL CORN RETURNS.

STATEMENT showing what has been, during seven years ending Christmas Day, 1917, the average price of an Imperial bushel of British wheat, barley, and oats, computed from the weekly averages of Corn Returns, for the purposes of the Tithe Acts, pursuant to the Corn Returns Act, 1882.

Wheat.	Barley.	Oats.
s. *d.* 5 8½	*s.* *d.* 4 9¼	*s.* *d.* 3 5½

Board of Agriculture and Fisheries,
31st December, 1917. R. HENRY REW.

NOTE.—The value of £100 Tithe Rent-charge for the year 1918, as varied in accordance with the Septennial average prices of corn shown above, is calculated at £109 3*s.* 11*d.*

STATEMENT showing the average price of British corn, per quarter (Imperial measure) for the quarter ending Christmas, 1917, pursuant to the Corn Returns Act, 1882.

Wheat.	Barley.	Oats.
s. *d.* 70 7	*s.* *d.* 59 0	*s.* *d.* 43 7

Board of Agriculture and Fisheries,
31st December, 1917. R. HENRY REW.

STATEMENT showing the average price of an Imperial bushel of British corn, for the year ending Christmas, 1917, pursuant to the Corn Returns Act, 1882.

Wheat.	Barley.	Oats.
s. *d.* 9 5½	*s.* *d.* 8 1	*s.* *d.* 6 2¾

Board of Agriculture and Fisheries,
31st December, 1917. R. HENRY REW.

COMPARATIVE STATEMENT, for the years 1911 to 1917, of the quantities sold and the average prices per quarter (Imperial measure) of British corn as returned under the Corn Returns Act, 1882.

Year.	Quantities Sold.			Average Price.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	Qr.	Qr.	Qr.	*s.* *d.*	*s.* *d.*	*s.* *d.*
1911.. ..	3,140,257	3,123,986	858,341	31 8	27 3	18 10
1912.. ..	2,365,596	2,165,572	630,755	34 9	30 8	21 6
1913.. ..	2,511,297	2,948,930	659,298	31 8	27 3	19 1
1914.. ..	3,027,976	3,403,072	1,164,361	34 11	27 2	20 11
1915.. ..	3,225,198	2 552 128	1,181,480	52 10	37 4	30 2
1916.. ..	3,600,391	2.182,218	1 129,096	58 5	53 6	33 5
1917.. ..	2,386,196	2,416,966	823,072	75 9	64 9	49 10

Board of Agriculture and Fisheries,
31st December, 1917. R. HENRY REW.

The Weather in England during

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 1st Dec.:								
England, N.E. ..	47·3	+5·9	0·35	9	− 6	3	1·8	+0·4
England, E.	46·5	+5·3	0·66	17	+ 2	3	2·5	+1·0
Midland Counties ...	47·1	+6·3	0·47	12	− 5	4	1·8	+0·4
England, S.E. ...	47·2	+4·3	0·49	13	− 5	2	2·3	+0·8
England, N.W. ...	47·6	+5·3	1·07	27	+ 3	5	0·7	−0·6
England, S.W. ...	47·6	+3·7	0·28	7	−19	4	1·3	−0·4
English Channel ...	49·6	+2·1	0·23	6	−19	5	1·8	−0·1
Week ending 8th Dec.:								
England, N.E. ...	38·1	−1·9	0·09	2	−15	1	2·4	+1·1
England, E.	37·5	−2·8	0·10	3	−13	2	3·2	+1·8
Midland Counties ...	37·7	−2·1	0·15	4	−14	3	2·2	+1·0
England, S.E ...	38·4	−3·4	0·31	8	−16	3	3·4	+1·9
England, N.W. ..	40·6	−0·9	0·52	13	−13	5	1·3	+0·2
England, S.W. ...	40·8	−2·7	0·40	10	−26	3	1·8	+0·2
English Channel ...	44·3	−2·8	0·46	12	−21	3	2·2	+0·3
Week ending 15th Dec.:								
England, N.E. ..	37·7	−2·1	0·27	7	− 6	3	2·1	+0·9
England, E.	39·0	−1·2	0·28	7	− 8	4	1·3	0·0
Midland Counties ...	38·1	−1·7	0·14	4	−14	2	1·6	+0·4
England, S.E. ..	39·7	−2·3	0·45	11	− 8	3	1·6	+0·1
England, N.W. ..	39·0	−2·1	0·59	15	− 8	4	1·7	+0·7
England, S.W. ..	40·2	−2·8	0·33	8	− 23	2	2·4	+1·0
English Channel ..	44·7	−1·9	0·17	4	−22	4	2·3	+0·6
Week ending 22nd Dec.:								
England, N.E. ...	34·1	−4·6	0·74	19	+ 8	3	1·3	+0·2
England, E.	32·1	−6·6	0·26	6	− 3	2	2·2	+0·8
Midland Counties ...	31·1	−7·5	0·36	9	− 2	2	0·9	−0·2
England, S.E. ...	32·5	−7·9	0·63	16	+ 3	2	1·9	+0·3
England, N.W. ...	35·2	−5·0	0·48	12	− 5	2	1·0	−0·1
England, S.W. ...	34·1	−8·1	0·36	9	−13	2	2·5	+1·1
English Channel ...	40·2	−5·4	0·99	25	+ 8	2	1·8	+0·1
Week ending 29th Dec.:								
England, N.E. ..	36·5	−2·1	0·39	10	− 1	5	0·9	−0·3
England, E.	33·9	−4·3	0·40	10	− 2	6	1·4	+0·3
Midland Counties ...	35·6	−3·2	0·23	6	− 9	4	1·3	+0·3
England, S.E.... ..	34·8	−5·4	0·26	7	− 9	4	2·2	+1·0
England, N.W. ...	37·7	−2·1	0·09	2	−17	2	1·1	+0·2
England, S.W. ...	37·0	−4·8	0·16	4	−23	3	2·3	+1·2
English Channel ...	40·8	−4·5	0·22	5	−18	3	2·2	+0·5

* 1 inch = 2·54 centimetres.

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LIVE STOCK POLICY
OF THE
BOARD OF AGRICULTURE & FISHERIES
AND
THE MINISTRY OF FOOD.

THE Board of Agriculture and the Ministry of Food have jointly considered the supplies of concentrated feeding stuffs which are likely to be available between the present date and the 1st September next. The results of their investigations indicate such an acute shortage that drastic changes in the methods of feeding livestock are absolutely necessary.

The general principles which have been decided upon by the Board of Agriculture and the Ministry of Food, after the most anxious consideration, are as follows :—

(*a*) That the first call upon the stock of concentrated food is due to the horses, so that farm work and transport may be maintained.

(*b*) After the horses, it has been decided that cows actually in milk should have the next claim, because milk is absolutely indispensable for children and invalids.

(*c*) The small quantity of concentrated food left over should be apportioned to the breeding stock. With so short a food supply, some decrease in the total livestock of the country is necessary, but it is advisable that the decrease should be achieved by the slaughter of the older animals rather than by the cessation of breeding.

(*d*) There is absolutely no concentrated food to spare for fattening cattle, sheep and pigs. Under these circumstances it will be impossible during the winter to make beef, mutton and pork which are fat in the commonly accepted meaning of the term. But on a liberal ration of roots and straw, with a little hay, cattle and sheep can be brought to a condition in which they will be acceptable both to the butchers and the people. This is all we can hope for under the circumstances. Pigs can be grown on roots, grass and waste products.

In order that the supplies which are likely to be available may be made to hold out until after next harvest, it is absolutely necessary that the following rules should be strictly observed by all owners of livestock :—

Horses.—The maximum quantity of concentrated food of all kinds which can be used for horses kept for agricultural purposes is 7 cwt. per head from the present date to the end of April, which works out at an average daily ration of 10 lb. per head during the period. The requirements of farm-horses are less than half the total requirements of all the working horses in the country. Every farmer should reckon how many tons of oats he requires to keep for his own horses, at the rate of 19 cwt. per horse actually at work, and should add on to this quantity the amount he requires for seed. The total so arrived at should be compared with the total oats he possesses, and the balance should be sold, so that it may find its way to the other classes of horses, which are indispensable for maintaining the work of the nation. These other classes of horses include railway horses, pit ponies, and town delivery horses, which are just as indispensable as the horses on the farms. A farmer who keeps back his surplus of oats, over and above the requirements for horses and milch cows indicated above, and feeds cattle or pigs with them will be not only wasting the resources of the country but will be endangering its fighting power.

Cows.—Milch cows actually in milk must not get more than an average ration of 4 lb. per day of concentrated food from the present time until the end of April. While out at grass no concentrated food can be spared for them until the beginning of August, when they may get a daily ration of 2 lb. per head of cake.

Calves.—Calves may be allowed a total quantity of not more than ½ cwt. of concentrated food, which must suffice to carry them on from weaning time until they go out to grass.

Bulls.—Young growing bulls can be allowed a daily ration not exceeding 3 lb. per head per day of concentrated food until the grass comes.

Fattening Cattle.—Fattening cattle cannot be allowed any concentrated food at all.

Sheep.—No concentrated food can be spared for sheep other than breeding ewes. Such ewes may be allowed a total quantity of 14 lb. of concentrated food per head to help them through, if the weather is bad, until the grass comes. No concentrated food can be spared for lambs or fattening sheep.

Pigs.—Breeding sows may be allowed a total quantity of 4 cwt. of meal per head to carry them through the suckling period, and a further allowance of 1 cwt. of meal may be obtained for each young pig. A small allowance of meal can also be obtained for boars. Except the above allowances, no concentrated food is available for pigs.

Poultry.—The allowance of concentrated food which can be spared for poultry is at the rate of 1 oz. per day for laying hens hatched since 1st January, 1916, in addition to the allowance for a limited number of this year's chickens, which will be specially distributed.

Priority Certificates.—Owners of live stock can obtain, from the local Live Stock Commissioner of the Ministry of Food, Priority Certificates entitling them to purchase concentrated foods in accordance with the rations indicated above, but for no other animals,—*i.e.*, they can purchase 4 cwt. of meal for each breeding sow they possess, but they will not be given a certificate to purchase meal in respect of any fattening pigs they have on hand. The certificates entitle their holders to purchase from registered dealers, but do not guarantee them a supply.

No drastic reduction of live stock of any kind is necessary or desired; on the lines indicated above it is quite possible to maintain both a steady supply of meat and a head of cattle, sheep and pigs that can rapidly be raised to the old level when the situation becomes easier.

FEEDING OF LIVE STOCK

AND

INCREASED FOOD PRODUCTION: IMPORTANT STATEMENT.

IMPORTANT statements were made on 1st February by the Rt. Hon. R. E. Prothero (Minister for Agriculture) and Lord Rhondda (Food Controller) at a conference of representatives of the farmers' organisations of England and Wales at Caxton Hall, Westminster, in connection with the supply of feeding stuffs and the measures which have now become essential for the proper rationing of all classes of farm stock

Mr. PROTHERO said that in the next eight months this country would be going through the most critical period in its history as a nation and an Empire. It is absolutely essential that all should pull together. We are crossing the rapids, and unless all pull together and keep time, we may be swept to disaster. The great point is that there is an immense shortage of concentrated feeding stuffs. Free Trade has two sides. It is bad for the corn farmer; but it is in certain respects good for the meat and milk farmer, who have been able to bring into the country a great quantity of imported oats, barley, maize and oil cakes. Just as a consumer of bread now finds it difficult to realise the new situation, so it is difficult for the producer of meat and milk to realise that he cannot send round the corner and buy concentrated foods. There are not so many of these foods in the foreign markets on which he used to draw; the nation has not so much cash as it used to have in its pocket; and it is difficult to get the tonnage to bring the stuff over.

Allotment of Feeding Stuffs.—A calculation has been made of the oats in the country, and of the tailings, damaged wheat and barley, brewers' grains, millers' offals, and other feeding stuffs. There is not enough for the farmers to feed their cattle or horses or other live stock in the way they used to do, and a drastic change must be made or disaster is in front of them. The farmers are the best judges how they can use the limited quantity of feeding stuffs to the best advantage, but unless they work on a general plan it will be difficult to allocate the feeding stuffs fairly.

Oats.—With regard to oats, after deducting what is required for seed, and for milling for human food and as a carry-over, there is only enough to allow a reduced ration for working horses. It is not only farm horses, however, that must be kept in working condition. There are also, for instance, pit-ponies and the transport horses of the big towns, on which food distribution largely depends. An appeal is made to the farmers to make up their minds to fix on an average allowance, say of 10 lb. a day until they can get part of their food from the grass, for their actual working horses, to calculate what oats they will have left after providing for this ration, and to sell the remainder for the town and pit-horses. It is clear that this will not be a welcome suggestion, but if they use these oats for feeding pigs or lambs, farmers will not be making the best use of the national resources.

Horses.—As to horses, Mr. Prothero said that carriage and pleasure horses must either be killed or go on the grass. For thoroughbreds there is an allowance which works out at about one-third of 1 per cent. of the total oats allowed. We must have light horses in the country, and we must maintain the best breeds of horses. One-third of 1 per cent. of the total oats is not an extravagant price to pay for what in this country is regarded as a very valuable industry. Hunters will have to go on the grass as soon as possible and stay there.

Dairy Cows.—In the case of milch cows it is recognised that the maintenance of the milk supply is of vital importance to the country, because on it depends the child-life of the nation. An allowance of concentrated food-stuffs can be made for the next four months, but afterwards the cows must live chiefly on the grass.

Sheep.—Sheep will have to be fed on grass and green-stuffs, though it will be possible to allow a little concentrated food for breeding ewes. No concentrated food at all should be given to lambs. Such lambs as are not meant to be kept must go to the butcher as soon as they are weaned.

Pigs.—As to pigs, Mr. Prothero recalled that when he took up his position as President of the Board of Agriculture he used to say "Walk a pig instead of a puppy." He wished he could say so still, but, although the pig up to a certain point is the most economical animal they could feed, it competed with human beings for human food.

It has been usual to feed barley meal in considerable quantities to pigs; but this must stop. An allowance of concentrated food can be made to breeding sows, and to young pigs round about weaning time. This is all. The more pigs you can keep on grass, vetches, roots, and other food of a similar kind, the better. But farmers must loyally stick to the very limited allowance of dry food which is all that the nation can afford. Instead of fat pork and bacon we must have lean pork and bacon. Human beings can live much longer on 6 lb. or 7 lb. of meal than they can on its equivalent pound of pork.

Fattening Cattle.—There is not a sufficient supply of feeding stuffs to allow the use of concentrated food to fatten cattle. Farmers are back to the position of the early 'seventies and must grow their own produce and feed the cattle from it. They will not be able to bring forward cattle so young, and it will take a longer time to get them ready, but there is no concentrated food to spare for fattening cattle. It is necessary to emphasise the fact that the deficiency is not going to be merely temporary, but will last probably over this time next year.

Ploughing Grass and Raising Arable Crops.—Farmers have loyally responded to the appeal to plough up more land, but they ought not only to carry out the programme put before them with regard to corn, roots and potatoes ; they will be well advised to take in a little bit more, and grow some produce with which to feed their cattle. Mr. Prothero made a special appeal on behalf of potatoes. This is the biggest crop farmers can grow, and it fulfils two purposes. We cannot have too many potatoes, for they can be used to feed human beings, and also, if there are any to spare, to feed live stock. The Potato Order offers farmers a very reasonable scheme, and it is hoped that there will be a large increase in the amount of potatoes planted this year.

Realisation of our Position.—Though we are in the fourth year of the War there are still many people who do not realise the position in which we are placed. There are districts, some of them not far from London, which are like quiet backwaters. They do not even know that on the other side of the hill the torrent of national life is racing along in full flood. Some cynics may say, " This is nothing but froth and bubble," but most things said by cynics are untrue. One of the objects of the meeting was to ask the representatives of agriculture there assembled to help to make things known, and to create such a public opinion that every farmer will feel it to be his duty to act up to the spirit of the general plans prepared. Mr. Prothero and Lord Rhondda desire to help them to create that opinion and to translate it into public practice. They intend to send round people who will explain without any official jargon exactly our position. Meetings will be arranged, so that public attention may be rapidly drawn to the need of economising the scanty supply of concentrated foods we have.

There is not the faintest occasion for panic. Farmers are very fortunate in having had last year a good supply of roots and a good supply of oat straw. What they will miss is the concentrated foods, and their cattle will of necessity mature more slowly. But the number of live stock in the country is well up to the mark. Dairy cattle are practically the same as they were last summer. There is a diminution in the cattle of two years old and upwards, but the rising generation is there. As has been said, there is no occasion for panic if we keep our heads and try to pull together. Farmers must take Mr. Prothero's loyalty to their interests on trust. Farmers may rest assured that whatever the Government may decide to do, though there may have to be compromises, though farmers may not get exactly what they like, all members of the Government are in their different ways trying to do their best in very difficult circumstances. They ask not only the farmers, but also the labourers, without exception, to realise their responsibility and the tremendous national duty they have to perform. All have to scrap their personal grievances, forget irritation, and concentrate first and last on trying to meet national needs as best they can. It is the duty of every one of us to do everything we can to hold the food line firmly at home. The man who loafs on the farm is stabbing in the back his comrades in the trenches. It is up to both farmers and labourers to back up these men and not to let them down.

LORD RHONDDA said that there had been more than a suggestion lately that he and Mr. Prothero did not pull together. Anyone who puts forward such an assertion, or endeavours to create friction at the present time between any Department of the State and any section of the community, is an enemy to his country. We can only win this War—and we are going to win this War—by being a united nation. Some recent remarks of his had been misunderstood, and it had been asserted that they were directed against the agricultural community. Nothing was farther from his intentions. He was speaking generally when he said that no private interest and no class of individuals should stand between this country and the national interest. He did not believe that the farmers had stood in the way of national interests, indeed, he did not know of any class who had acted more patriotically during this War than had farmers. The business of farming is at all times an uncertain one. Farmers have much to contend against in the way of bad seasons and other matters beyond their control, and the Government, at this critical period, wish in every way to help them in satisfactorily solving the grave and difficult problems which face the country. Orders had been issued which might at times seem somewhat confusing.

Lord Rhondda admitted this and hoped that if there were any questions of doubt still remaining, he would be able to explain them satisfactorily, so that farmers would quite understand the mind of the Government. Orders have the force of law, and have to be put into legal language; hence they are not always easy to understand.

There is no reason to think that farmers will fail in their duty and responsibility. If we can only secure one million acres of potatoes in England and Wales, we shall make ourselves safe. The food position is undoubtedly very grave, but there is no fear of starvation—starvation, that is to say involving such privation as would lead to disease and death. There is no likelihood of that. At the very worst it would be possible to give rations of meat, bread and fats to an extent of something like 50 per cent. above that which the Germans pretended to give and did not give.

The Ministry of Food have under consideration a system of sale by dead weight of beef and mutton, which would do away with the system of grading and valuation, with its frequent unfairness as between the producer and retailer. They are also considering the question of controlling the price for store cattle. The valuation system of sheep has not been satisfactory. With regard to the Lambs Order, its main object was not to increase the number of sheep, but to prevent the use of feeding stuffs Subject to an undertaking being given that no concentrated food will be consumed, it has been decided to grant permission to farmers to sell for slaughter lambs of any breed.

The Potato Crop.—Lord Rhondda stated that the scheme in operation last year in regard to the potato crop was open to several serious objections. It guaranteed the farmer a price, but it did not guarantee a certain market. It cut at the root of all previous custom, because the price offered by the Government was a flat one, and paid no attention to the varying kinds of potatoes, the soil on which they were grown, or the time when they were normally fit for delivery. It was determined that we should not fall into similar mistakes this year. The Ministry of Food wished to leave as much freedom as possible to the farmer until 1st November. If prices ruled high before that date, because Nature had been unkind, the farmer could take advantage of them. If they ruled low because Nature was bountiful, he could restrict his selling. In any case, if circumstances compelled the Government to fix maximum prices before 1st November, these maxima would be not lower than the generous scale indicated in the announcement, which fell gradually from £14 in the early part of July to £7 in September and October. With a view to encouraging the maintenance and, indeed, the increase of the 1917 crop of potatoes, the

Ministry is prepared to make contracts* for potatoes grown on any farm, on any acreage in excess of that under potatoes on the same farm in 1916 or 1917; in the former year the acreage was exceptionally low. The prices to be paid for these contract potatoes actually equal in England the maximum prices which any farmer has been able to get during the present season.

On and from 1st November, the Ministry will take over the whole of the remaining crop in Great Britain, and the farmer is assured that in assessing the price the Ministry will consider the size of the crop, the quality of the potato, the district where it was grown, and the time when it was delivered. If everything goes smoothly, the average price to be paid for the worst quality potato will be £5 15*s*. per ton in England, and £5 5*s*. per ton in Scotland. Better varieties will receive a proportionate increase in price, and if, unfortunately, in any defined potato district the crop is a partial or total failure, the purchase price will be proportionately advanced.

There will, therefore, be no question of a farmer having to find a market, nor of being paid for his potatoes partly by the purchaser and partly by the Government. There is, further, no question of a farmer finding that his crop is being ruined because he cannot market it. Adequate transport arrangements, it is hoped, will be made, but if in any particular instance these transport arrangements break down, and varieties that would not keep consequently deteriorate to an abnormal extent, the Department will bear the loss. In all these arrangements the Ministry have been working in close co-operation with the Board of Agriculture. Lord Rhondda stated that he is conscious of the difficulties which farmers will experience in harvesting their crops, and the Food Production Department, in conjunction with the Ministry of National Service, will endeavour to organise gangs of labourers in all parts of the country, who will assist the agricultural community. Humanly speaking, everything possible has been done to ensure that the farmer shall be treated generously and sympathetically. We cannot count on the 1918 crop being of the same bulk as 1917, unless definite and widespread increase in potato acreage is provided. The Government having done their part, the responsibility now lies on the farmers. Lord Rhondda had no reason to think that when they have studied these arrangements very carefully, they will fail to do their duty, not only because that duty is a plain national one, but also as a recognition that the Ministry of Food have realised their difficulties, and have framed a scheme which should remove them.

LORD CHAPLIN moved a vote of thanks to Lord Rhondda and Mr. Prothero for their addresses.

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* See pp. 1222–5.

POVERTY BOTTOM: AN EXPERIMENT IN INCREASED FOOD PRODUCTION.

W. SOMERVILLE, M.A., D.Sc.,

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CONSIDERABLE acquaintance with practical and experimental agriculture has led the writer to the conclusion that much of the land of England is producing less food than is possible, and that even the most hopeless-looking proposition is capable of great and profitable improvement. It is scarcely necessary to say that many farmers are so generous and yet so discriminating in their expenditure on fertilisers, and conduct their business with so much ability, that it would be difficult to suggest how the produce of their holdings could be profitably increased. Unfortunately, it is also true that enormous areas are miserably farmed and produce but a fraction of the food of which they are capable. Nor is it always a case of lack of capital. It would not be difficult in a single district to point to farmers, in possession of spare capital, who are content to get an easy living by methods of farming which are opposed to the best interests of the Nation.

The writer had for years been advocating the doctrine that, in the improvement of English land, many farmers had an investment ready to hand of the most attractive character. A tenant of a farm too often thinks he has exhausted its possibilities when he has provided it with the conventional equipment, by means of which he extracts from the soil the rather low output per acre which gives him the kind of living that he set out to expect. The matter however, can be looked at from a somewhat different point of view. When a man rents or buys a farm he secures the monopoly of the use of an agent of production, and his first step should be to explore the opportunities that he thus controls. Whatever be the line of farming that he decides to follow—whether dairying, sheep breeding, cattle rearing, grain growing, etc.—the basis of his business is the production of vegetable substance (corn, roots, hay, pasture, and so forth). If he has any desire to utilise his monopoly-position to the full he should at once proceed to determine the limits to which he can go in the investment of capital in producing these substances, and it will often be found that the employment of fresh doses of capital will give such a percentage return as would excite the envy of those engaged in what are considered more lucrative industries.

While financial success is the primary stimulus to all commercial activity, agriculture seems to offer an additional incentive to effort—the satisfaction that is felt in converting air, water, and soil into human food, with the full knowledge that too much food can never be produced in these islands.

It is a matter of common observation that many theories, attractive enough in the abstract, break down under the test of practice, and it therefore seemed to the writer that, to be consistent, he should risk his own capital and practice what he preached. He accordingly began to look about for some land sufficiently bad to supply a test hard enough to confirm his opinion, and to convince any who might take an interest in such work. It seemed to be generally agreed that thin soil on the Chalk represented about the poorest and least productive land in the south of England, and certainly there are wide areas of such soil which are let at a very low rental, or are absolutely abandoned to rabbits Moreover, the Cretaceous system is the most extensive single geological formation in England, covering wide areas in the counties of York, Lincoln, Norfolk, Suffolk, Cambridge, Buckingham, Herts, Oxford, Berkshire, Hampshire, Wiltshire, Dorset, Surrey, Sussex, and Kent. It seemed, therefore, to be an advantage that the experiment should be made on a type of soil so extensively represented that the results, whether failure or success, would be capable of wide application.

At my request the Board of Agriculture were so good as to calculate the area occupied by the Cretaceous system, and the following figures were obtained :—

	Acres		*Acres*
Total for England .	6,190,000	County of Berks ..	179,200
South of the Thames	3,209,600	,, ,, Wilts	529,920
County of Sussex ..	832,000	,, ,, Bucks ..	144,000
,, ,, Kent ..	556.800	,, ,, Hants ..	566,400
,, ,, Surrey ..	284,160	,, ,, Dorset ..	192,000

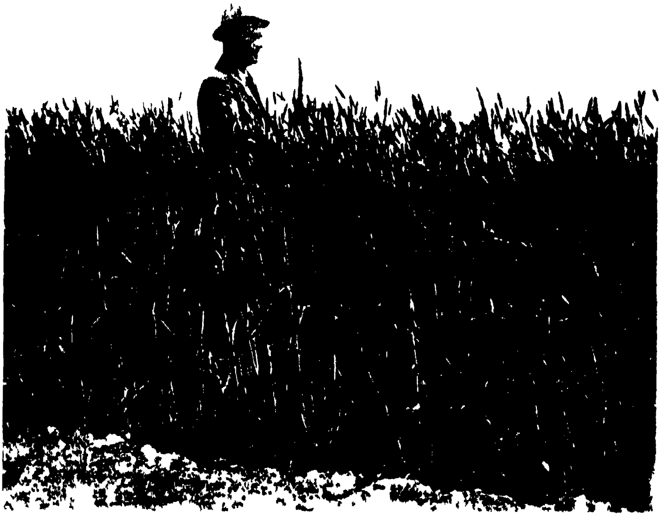
Description of "Poverty Bottom."—Search for a farm was in the first instance directed to the Downs of Berkshire, Hampshire and Wiltshire, but without result. In the autumn of 1910 a farm of 530 acres was inspected—situated on the South Downs within a mile of Newhaven in the county of Sussex. The place was untenanted and unstocked, and appeared to be as near the bedrock of infertility as could be desired. Its name, too, "Poverty Bottom," seemed to indicate that its condition of barrenness was no new thing, but was inherent to the place. The rent paid by the tenant who left at Michaelmas, 1910, was £175, or a little over 6*s.* per acre. Terms having been arranged, possession was obtained on 8th February, 1911, so that seven seasons' farming has now been experienced.

The English Channel is about a mile from the nearest point. In altitude the land varies between 50 and 440 ft. Most of it lies in a shallow valley that runs roughly east and west from the lowest to the highest point of the ground. A former owner had enclosed the whole with a light wire fence, and divided it into five large fields. Each of these was provided with a drinking-trough supplied with water by the local Water Company. The fences and water are a great convenience, but both have to be paid for in the form of interest and a sinking fund, amounting to £47 7*s.* 2*d.* per annum, on a Land Improvement loan for £764, contracted in 1908, and extinguishable in 25 years. There is also a charge of £5 a year for the water supplied.

The buildings consisted of two cottages, and two sets of farm buildings capable of accommodating about 60 cattle of varying ages. Two lean-to sheds were subsequently erected, so that about 110 cattle can now be housed through the winter, any beyond that number having to lie out. There was no farmhouse on the place, but a small villa some 400 yards from the boundary was purchased, and this supplies a residence for the manager.

The 530 acres comprised 80 acres of cultivated land, the remainder being under grass, and these proportions have, so far, been retained. At present, however, the tillage area is being largely increased, and it is hoped that ere long nothing but the steepest and thinnest land will remain in pasture. The soil consists of flinty loam varying somewhat in depth, but often very thin On most of this ground the pure Chalk occurs at a depth of 6 or 8 in., but in places it is practically on the surface.

The Grass Land.—Most of the grass land had, at one time, been under some sort of cultivation, but whether it had been sown down, or had "tumbled down," it would be hard to say. For the most part the herbage consisted of a thin, patchy covering of poor wiry grass (yellow oat grass, *Agrostis, Phleum bulbosum,* etc.) with a large proportion of chalk-land weeds (hawkweed, ribgrass, mouse-ear chickweed, geranium, etc.) and a fair quantity of Leguminosæ, chiefly hop-clover, black medick and suckling clover. Burnet was fairly abundant in places. Here and there the surface was practically destitute



Red Standard Wheat on the lightest part of the field 1916 The staff is 5 ft high
(Reproduced by courtesy of the Editor of *Country Life*)

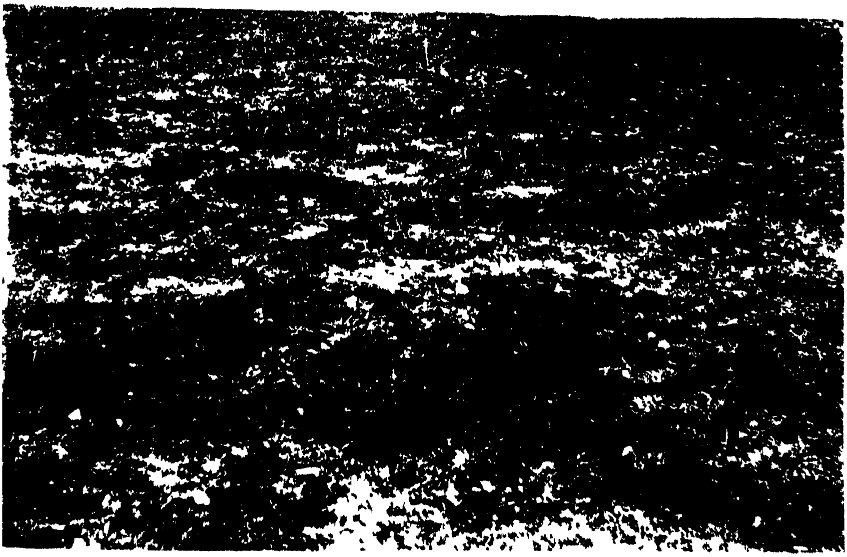


FIG. 2 Photo taken in May, 1911, before improvement was begun Note the chalk showing on the surface and the sparse herbage

of all vegetation (see Fig. 2). An indication of the character of much of the land is given in Fig. 6, which represents land and stock adjoining the boundary. In the aggregate, there were about 90 acres of old Down turf, not exactly "virgin," but which had probably not been under the plough for centuries. Some of it is terraced, and balked in the manner that is associated with Neolithic cultivation. While this old herbage is very short it is at least close. When it has been stimulated by basic slag it comes nearer to resembling a thick-piled Turkey carpet than any pasture with which the writer is acquainted. The chief grasses here were sheep's fescue and hard-fescue, while Leguminosæ, though very dwarf, were present in large variety, notably bird's-foot trefoil, kidney vetch, and white clover, with a sprinkling of red clover, black medick and suckling clover.

Clearing Off Gorse.—A considerable area of the grass land—perhaps about 40 acres—was covered with gorse. While a few clumps of gorse are not undesirable on wind-swept Down land, 40 acres was certainly beyond the requirements of the place. To "stub" it out by the roots would have cost much more than the freehold value of the land, and, in any case, this method of treatment is by no means effective. Burning in winter and spring does nothing to eradicate the plant, which soon shoots up denser than ever. It seemed probable that burning in the height of summer would be most likely to destroy the plant. At that time the reserves of starch are, to a certain extent, withdrawn from the roots and are present in the stems. If, then, the plants could be destroyed when the storage cells in the roots were comparatively empty, it appeared likely that the roots would not have the strength necessary to produce vigorous new shoots. Moreover, what shoots were produced would be formed about September, and as there would not be time enough for them to ripen and harden off before frost occurred, they would be likely to suffer from the cold of winter. The result has shown that, in the main, the reasoning was sound. Most of the gorse was burned in the latter half of July, 1911, and although many plants have sprouted from the root many have been killed outright, and cattle and sheep can now range over land which previously was almost an impenetrable jungle. If burning in July every three or four years is persisted in it appears certain that the gorse will ultimately be eradicated at a negligible outlay.

Sowing Clovers.—At the time of burning the gorse in July, 1911, a mixture of seeds of various clovers (including wild white) was scattered over the ashes of a considerable part of the burnt gorse area at the rate of about 20 lb. per acre. Very few of the seeds seemed to produce plants, except in the case of wild white clover, which germinated well and in 1912 made a fine show amongst the old gorse stumps. Where the gorse sprouted again the clover has been crowded out, but in other cases it has been quite a success, and appears to have justified the expenditure. The seed of wild white clover cost 2*s*. 9*d*. per lb. in 1911, as compared with a present price nearer 20*s*. per lb.

As wild white clover is referred to it may be worth while to mention an experiment that proved a great success. About 6 lb. of seed remained over after the burned gorse areas had been treated, and in August, 1911. this seed was sprinkled on a strip of 1¾ acres across a very poor pasture field whose thin herbage consisted chiefly of *Agrostis*. The field had not been down in grass for more than three or four years, so that there was plenty of room for much of the seed to reach the soil. The seed was not harrowed in, or covered in any way. No effect was observable in 1912. 1913, 1914, or 1915. and the conclusion was reached that the trial was a failure. In the autumn of 1915, however, the whole field was dressed with basic slag, and in July, 1916, the band that had been seeded showed up like a white sheet across the field The whole field was cut for hay, and the seeded portion was allowed to stand a fortnight longer, and become dead ripe before being cut. It was subsequently threshed, and yielded over 400 lb. of half-dressed white clover seed (which in the spring and autumn of 1917 was scattered over other grass fields). The field was again cut for hay in 1917 but the clover was not so conspicuous as in 1916. Stock grazing the aftermath, however, frequent this belt of ground to a far greater extent than the rest of the field, so much so, in fact, that it is no unusual sight to see 20 cattle and 100 sheep crowded on to this area, and not an animal to be seen on any other part of the field.

Planting Trees.—In the first two years 13 acres, in six inclosures, were planted with trees, with the view of providing shelter. The conditions for tree-growth are very unfavourable, but certain species (notably *Cupressus macrocarpa*) are fairly promising, though it will be some years before the plantations do much to break the force of the wind.

The Whole Area.—Deducting the plantations, roads, buildings, an orchard, etc., about 510 acres are left for agricultural and pastoral purposes,

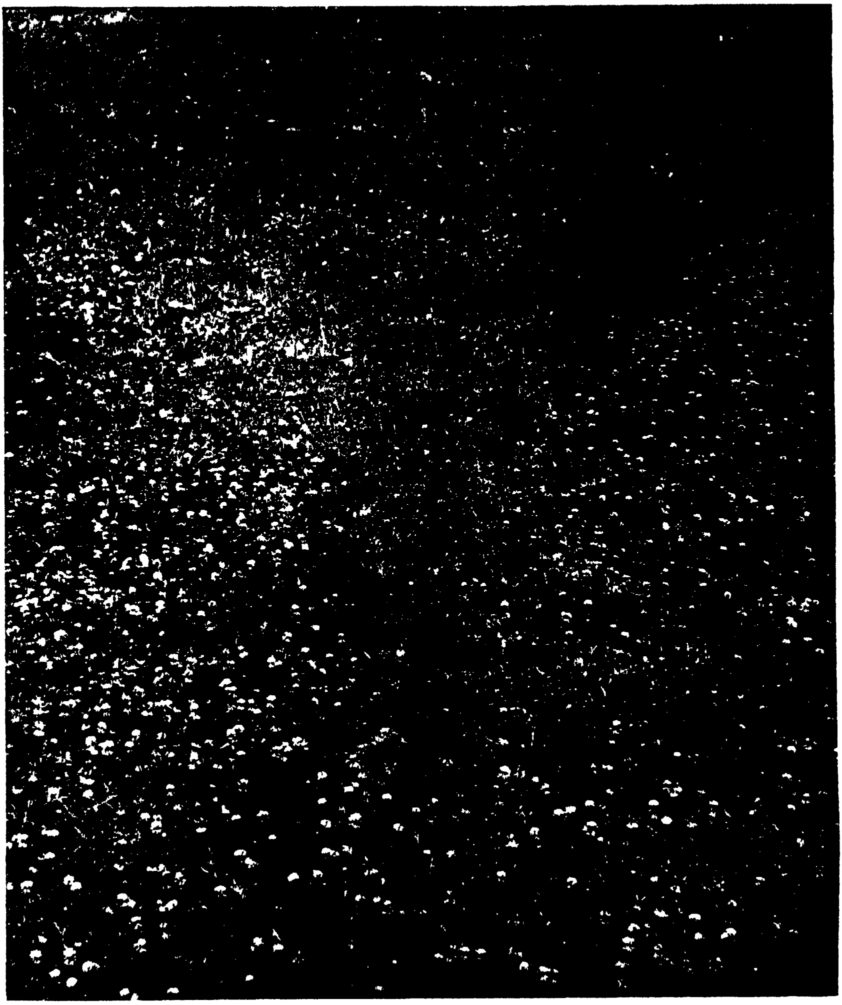
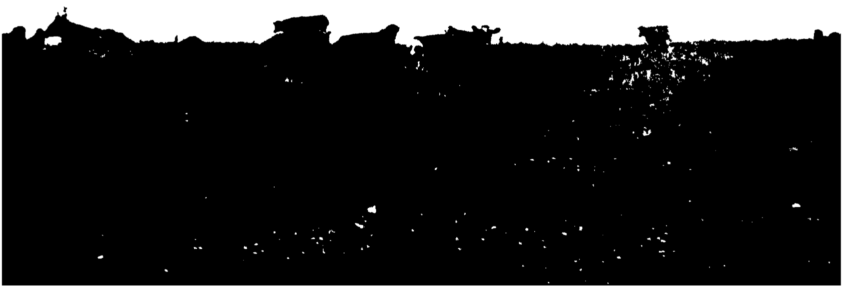


FIG. [illegible] Photo taken in July 1914. A triangle with its apex in the middle of the photo towards the spectator was left unslagged in 1911. The white clover is seen thick on both sides.



Early in 1914 an opportunity occurred to rent 80 acres of derelict grass land adjoining. Although the lease is only for 10 years it was considered worth while to fence this area and lay on water. It was also dressed in the spring of 1914 with fully 8 cwt. per acre of basic slag. The quality of this land is best indicated by the rent, which is £13 a year, the landlord paying rates (Fig. 5). The whole area, therefore, *for the past four years* has amounted practically to 600 acres.

The main lines laid down for the improvement of the place were as indicated below :—

Liberal Use of Phosphates on the Grass and Tillage Land.—Like most Down farms, Poverty Bottom had been "sheeped" from time immemorial, a type of farming that means the annual removal of relatively large quantities of phosphates in the form of bone. The first step in grading up a run-down farm of this character seemed, therefore, to be to restore to the land a stock of phosphates, and within two months of acquiring the place 200 tons of basic slag were applied. Deducting plantations, roads, gorse, buildings, etc., this meant an average dressing of about 8 cwt. per acre.

The first year (1911) was a season of unprecedented heat and drought, and the slag had practically no effect, though it began to show some small results in the late autumn. In the following year, and subsequently, confidence in basic slag has been fully justified Undressed patches at various parts of the farm are sharply distinguishable, so much so in certain seasons that the "slag lines" can be seen a mile away (see Fig. 3). All the Leguminosæ are greatly increased by the slag. In some years, or at certain seasons of the year, it is white clover that is the characteristic feature, at other times it may be kidney vetch, and in 1917 the most conspicuous plant was bird's-foot trefoil. In the middle of July of that year there was a sharp line between the drab colour of the untreated area and the golden yellow of the slagged ground that could be seen from a long distance.

The improvement in past years of poor pastures by the use of phosphates is going to have no small influence on the yiel[illegible] grain, now that the pastures are being broken up. Thi[illegible]provement is, in the main, due to the increase of nitrogenous humus, brought about by the stimulated growth of the Leguminosæ. Supplies of soil from slagged and unslagged land at Poverty Bottom were used in 1914 for making pot-cultures with oats, when it was found that the yield from the soil slagged three years previously was improved to the extent of over 100 per cent.* The writer has no doubt that, under the ploughing programme that is now in progress at Poverty Bottom, a similar indirect effect of slag will be reflected in the yield of corn

As it was clear that basic slag was effective, the grass land was regularly redressed with 5 cwt. per acre every three or four years. The tillage land, which is worked, for the most part, on the four-course rotation, got in the earlier years 5 cwt. of slag per acre for the roots and 5 cwt. for the clover (applied in the previous autumn to the stubble), but now the stock of phosphate in the soil seems to make it unnecessary to do more than apply slag every four years to the roots, the intervening crops being nourished by the residues. Altogether, 378 tons 6 cwt. of basic slag have been used on the place during the past seven seasons.

Admixture of Cattle with Sheep on the Pastures.—Speaking generally, Down farms have been grazed for centuries by nothing but sheep. The land is usually unfenced, and, without fences, the grazing of cattle and horses is practically impossible. The sheep is an animal that is very sensitive to attack from intestinal worms and other parasites, and these troubles are much accentuated, especially amongst lambs, by the constant and close grazing of sheep alone. The place had a very bad reputation for a high death-rate amongst sheep. It is understood that in 1907-8-9 the writer's predecessor brought on to the place 700 Cheviot ewes, and that only 400 survived. In the first year or two the mortality in the writer's own flock was unpleasantly high. In the first year the death-rate among the ewes was 15 per cent., in the second it was 10 per cent., in both the third and fourth years it was 6 per cent., in the fifth it was 8 per cent. (largely due to the inclement weather during the lambing season of 1916), while last year it was 4 per cent. This improvement is attributed to comparatively thin-stocking with sheep, and a large admixture of cattle. Moreover, the writer holds that pastures are much more fully utilised by grazing sheep and cattle together than by only one class of animal. The unhealthy character of the place at the outset also resulted in abortion among the ewes, and many of the lambs, though born alive, were evidently premature, and consequently weak. Whereas in the first year the number of lambs weaned per 100 ewes was only 83, in the last year (1917) it was 129.

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* Details are given in papers by the writer, entitled "Accumulated Fertility in Grass-land in consequence of Phosphatic Manuring": see this *Journal*, September, 1914, and March, 1916.

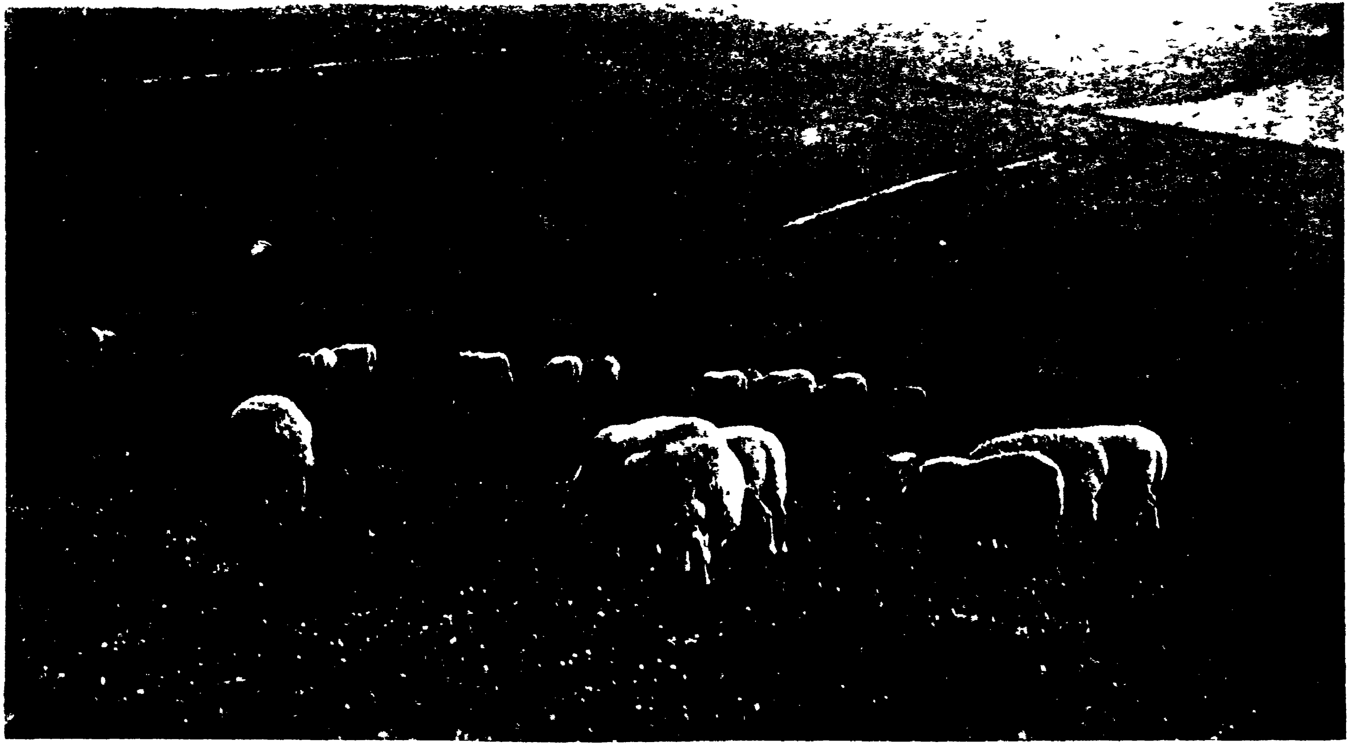

FIG. 5.—Photo taken in July 1916, showing the derelict building-land rented and slagged in the spring of 1914 Cheviot ewes and Cheviot Southdown lambs

Manuring the Tillage Land with Nitrogen Collected on the Grass Land.—About 100 acres of Down grass have been mowed each year, and although the crop is a very light one—5 to 15 cwt. per acre—it contains a large proportion of leguminous herbage. The hay is consumed in the yards, and the manure applied to the tillage land, which is thus indirectly enriched by nitrogen fixed in the hay fields. The fertility of the tillage land has been markedly improved during the past few years, a result to be attributed in no small measure to the effect of this organic nitrogen collected on the place.

Apart from the indirect influence which the Down hay fields have on the tillage land, it is a great advantage in normal times to cut a large area of grass even if the crop is small, for thereby one secures a corresponding extent of clean aftermath on which to wean lambs The latter also comes in most usefully for general stock at a time of year (August) when the pastures, especially in a dry season, are apt to be bare. The writer has never used any farmyard or nitrogenous manure on the grass land, being satisfied that a small crop of hay produced by phosphates has more feeding value than a much larger crop forced by nitrogen. He did, however, experiment with potash fairly extensively in the first two years, both on the grass and tillage land, but found that it had no effect. The chemical analysis of the soil showed the following percentage of potash :—

	Field I.	*Field II.*	*Field III.*
Total Potash	0·138	0·210	0·102
Available Potash	0·0017	0·0027	0·0071

These figures indicate a marked deficiency of potash, but, so far as the writer's experience goes, it is hard to get practical guidance in manuring from analytical figures of soil.

Dependence Placed on Home-reared Stock.—It was necessary, of course, to purchase both sheep and cattle in the first year, but it was determined that the place should as soon as possible be made self-supporting in the matter of live stock.

Sheep.—In the autumn of the first two years draft Cheviot and Southdown ewes were bought. most of them being sold after producing a single lamb. Annual turnover of the flock in this way involved more buying and selling than appeared desirable, for it seemed that with commissions, carriages, and middleman's profits. a big deduction would have to be made from gross returns. In the spring of 1914, 110 well-developed Cheviot ewe hoggs (tegs) were obtained from Sutherland, and in due course these were mated with a Southdown ram (Fig. 5). From the cross lambs born in the spring of 1915 about 40 females were reserved for stock, and similarly in subsequent years, and these are also mated with the Southdown. The second-cross lambs are therefore three-quarter Southdown and one-quarter Cheviot, and, as the next generation will possess only one-eighth Cheviot blood, it will be but a short time before the flock is essentially a Southdown one. Whether the infusion of the Cheviot blood will be of permanent advantage remains to be seen, but so far the results are satisfactory.

Cattle.—As regards cattle the system followed is to keep 9 or 10 cows and to rear the calves by suckling. When a calf is born another is bought in, and night and morning the cow is brought into the byre, and tied up to a stake, the two calves suckling her. In 3 months these calves are weaned and two others are put on, these also suckling their foster mother for about 3 months. Whether the cow can nurse a third pair of calves, or only a fifth individual one, depends on her condition, but, considering that she gets no concentrated food, one may be satisfied if she rears 4 or 5 calves in a season Heifers often only rear 3.

The cows are partly Shorthorn and partly Polled Angus (Fig. 4). For the past three years they have all been mated with a Polled Angus bull, while the calves purchased have usually been Shorthorn-Sussex crosses. In the first two or three years the death-rate amongst the calves was distinctly high, but as the place has improved the calves born have been stronger, and have been better able to resist the ailments to which calves are liable. Then again, we are more careful than formerly to buy only strong calves and, if possible, calves 10 days to a fortnight old, believing that a few extra days of age are well worth the extra price. In the first two years the death-rate amongst the calves was 10 per cent., but by 1914–1915 it was down to 3 per cent., and up to the time of writing there has been no death for about three years.

As illustrating the "comfortable" position that one finds oneself in as the result of pursuing the policy of making a place as near as may be self-supporting in the matter of stock, it may be said that in the last three years only £11 has been spent on the purchase of sheep (rams), while the sales in the same period have totalled £1,577 6*s.* 6*d.* As regards cattle, there has been spent in the last three years only £145 13*s.* (calves), whereas the sales have come to £2,805 6*s.* 4*d.*

Catch Cropping.—Poverty Bottom is situated in a district where catch cropping is much practised, and during the first

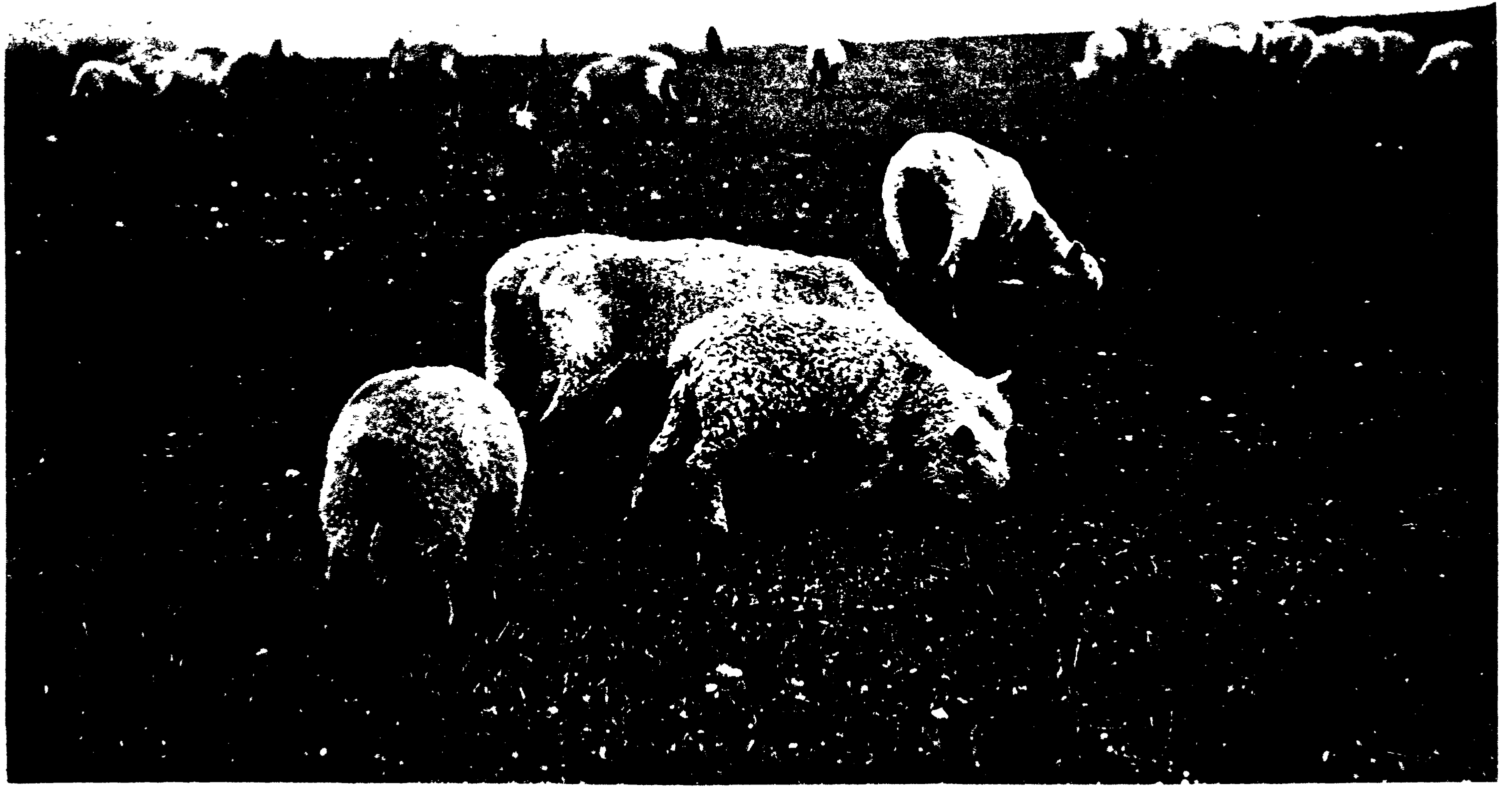

FIG 6.—Photo taken in June, 1916, of land adjoining Poverty Bottom, not improved. The white spots are chalky flints, *not* White Clover! The quality of the grazing is reflected in the condition of the stock. This land is no worse than much of Poverty Bottom, and would similarly respond to phosphates.

two or three years the example of neighbours was followed in this respect. Although, however, it seems very attractive to get a catch crop of rye, winter barley, crimson clover, or vetches sandwiched in between corn and roots, the custom is associated with several disadvantages. It is true that if the harvest is early, and the winter mild, one gets a lot of useful sheep-keep in April, May and June; but the presence of a catch crop on the ground till well into summer greatly delays the sowing of the succeeding root crop. Moreover, the presence of a catch crop prevents the spreading of dung on the land during winter. Perhaps the most serious drawback to such cropping, however, consists in the fact that the catch crop leaves the land very dry, so that the seed of the root crop that follows germinates badly and the seedling plants suffer from lack of moisture.

Mangolds instead of Catch Cropping.—For the last three years catch cropping has been entirely abandoned, and this has enabled mangolds to be sown early in April, with the result that in 1916 and 1917 this crop averaged over 40 tons per acre. Abundance of mangolds for cattle, ewes and other sheep in spring and early summer seems to be no bad substitute for a catch crop, and makes possible, for instance, putting up in April an extra lot of cattle to fatten, to go to market in June, at a time when the demand for beef has hitherto been very keen Nor do the ewes and lambs seem to miss the spring "feed" that a catch crop gives. In its place they get mangolds dropped on the pastures from a north-country cutting cart—a most useful implement that is found on almost every farm on the Borders but is unknown, so far as the writer's observation goes, in the South. That the sheep do not seem to suffer from the want of folding-crops in early summer seems to be proved by the fact that fat lambs born in April at Poverty Bottom often top the market in Lewes, though never having had a bite of cake—getting nothing, in fact, but the Down pasture; whereas other older lambs in the same market, which have been folded and caked from birth, fetch less money. Of 234 lambs (chiefly Cheviot-Southdown first cross, a few second cross) born in 1917, less 45 females reserved for stock, 110 were sold off their mothers from 30th July onwards at an average price of 53*s.*, the first 63 averaging 58*s.* 1*d.*, and the first 15 averaging 65*s.* 7*d*

The Measure of the Improved Productivity of the Farm.—The previous occupier left at Michaelmas, 1910, and his shepherd is still in service on the farm. He informs me that *the stocking* *of the place in the summer of 1910* was approximately 200 Cheviot ewes, 180 lambs, and 15 cattle 1½ years old and upwards. *The stock in 1916* was 118 ewes and tegs, 74 lambs, 67 cattle over 1½ years, and 34 yearlings. This is in addition to 100 ewes, 110 lambs and 20 yearling cattle that grazed the 80 acres of extra grass which were added to the farm in the spring of 1914. The year 1917 has not been taken for comparison, because, on account of the scarcity of feeding stuffs, and in order to comply with suggestions from the Food Production and Food Control Departments, the horned stock has been materially reduced during the past 12 months. If the mixed stock be calculated in terms of full-grown sheep, by regarding three lambs as equal to one sheep, two yearling cattle as equal to one beast of 1½ years of age and upwards, and four full-grown sheep as equal to one beast 1½ years old and over, *the stock in 1910 was the equivalent of 320 sheep, the corresponding figure for 1916 being 479. On this basis of calculation the head of stock has been increased by 50 per cent. as the result of improved conditions.*

It is, however, one of the features of the improvement of poor grass land that not only will it carry a larger head of stock, but the growth and well-doing of each individual animal are also correspondingly increased. This result comes out very clearly in the various "Manuring for Mutton" experiments that have been conducted in different parts of the country.* Thus, at Cockle Park in 1899, six sheep grazed the unmanured 3-acre plot in Tree Field and gave an average increase of live weight of 24 lb. per head. On another plot of equal area in the same field, which had two years previously been liberally slagged, 12 sheep were grazed, and they showed an average gain of 53 lb. per head. Here, then, is a case where improved treatment enabled the land to carry double the stock, and yet, notwithstanding the heavier stocking, each individual animal throve more than twice as well, so that the measure of the improvment is not 1 × 2 = 2, but 1 × 2 × 2 = 4. There seems to be no doubt that a similar result has been got at Poverty Bottom, and that *the productivity of the place in terms of meat has, in six years, been raised three-fold, i.e.*, 1 × 1½ × 2 = 3.

A measure of the improved productivity is also furnished by an examination of the sales of sheep (including wool) and cattle, which are set out in the accompanying table. The first period covers the interval, roughly 9 months, between getting possession of the place on 8th February, 1911, and Michaelmas of that year. The other years are from one Michaelmas to the next. The valuation from 1913 onwards was made by a professional valuer, and was kept on a conservative basis, only stock that were to be marketed within six months being put in at anything like current prices. The sales of 1913-14 are abnormally high, because early in September, 1914, all the lambs and two-year-old steers had to be sold on account of the partial failure of the mangold crop of that year. This result was due to almost continuous drought from 6th April till the end of May, during which time less than 1 in. of rain fell at the farm. The yield of hay and straw in that year was also very light, so that instead of the lambs and steers being fattened off during the winter of 1914–15 they had to be marketed as stores.

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* See paper by the writer, entitled "Influence on the Production of Mutton of Manures applied to Pasture." Supplement to this *Journal*, January, 1911.

The table (p. 1199) shows the valuation of sheep and cattle at the end of each year (Michaelmas) and therefore at the beginning of the next, and the purchases and sales during each respective year. If the valuation at the beginning of a year and the purchases during that year are added together, and the sum deducted from the sum of the sales during the year and the valuation at the end, we get the gross return during the year. The last column shows that this figure has risen in the case of sheep from £76 10*s.* 3*d.* in 1911 to £658 16*s.* 7*d.* in 1917; and, in the case of cattle, from £106 15*s.* 6*d.* to £1,545 13*s.* In comparing these figures one has to remember (1) that the period to Michaelmas, 1911, was only from 8th February to 29th September, (2) that the 80 acres of additional grass acquired in the spring of 1914 was making an appreciable contribution to the returns in the subsequent years, and (3) that the sale of cattle in 1917 was quite abnormal, being due to reduction of stock, as explained above.

Turning to the produce of grain it may be remarked that until the outbreak of war the area under grain was practically 40 acres per annum, but for the crops of 1915 and 1916 it has been about 44 acres. In the first two years a small proportion of barley was grown, but since then the corn crop h[illegible]sisted of about equal parts of wheat and oats, and of th[illegible]out two-thirds are sown in autumn and one-third in spring. The first year (1911) was the season of unprecedented heat and drought. The wheat crop of that year was spring sown. As there had been no time to get "condition" into the land the crops were very poor—wheat 16 bush., oats 12 bush., barley 11 bush., per acre. The season of 1914 was also a very trying one for spring corn, and this is reflected in the poor yield of oats of that year. The season of 1916 suited dry, chalky soils, and in that year the following averages were obtained:—

Spring Oats (*Abundance*)	67 bush. per acre.
Winter " (*Winter Grey*)	57 " "
Wheat (*Red Standard*)	51 " "
" (*Rivet*)	30 " "
Mangolds	45 tons "

These yields, with the exception of Rivet wheat, would be considered satisfactory even on good land. They show what some of the poorest land in England is capable of, given manurial condition, fair cultivation, and a sufficiency of rain. (See Fig. 1.)

The corn crop of 1917 has not yet been threshed, but the mangold crop of this year has been weighed and has averaged 43 tons per acre. The yields of mangolds (Yellow Globe) on this thin, chalky soil have been surprising, especially as the manuring has not been excessive, namely, 12 tons of dung ploughed in with the stubble, 5 cwt. of slag in February, and 1½ cwt. sulphate of ammonia, and 3 cwt. of salt in April. For the last two years the mangold crop has been grown on 27-in. raised "stitches," by which method of cultivation the horse-hoe can be got much sooner to work, and thus weeds are kept down and moisture is conserved. It is a practice unknown, so far as the writer's experience goes, on the Downs.

The following is a tabular statement of the grain thrashed and sold:—

Year.	Wheat.	Oats.	Barley.	Total Yield of Grain.	Total Sales of Grain.
	Qr.	Qr.	Qr.	Qr.	£ s. d.
1911	10½	38	16½	65	16 13 0
1912	36	139	10	185	139 11 5
1913	47	164	—	211	153 18 6
1914	64	98	—	162	252 13 6
1915	87	133	—	220	367 1 6
1916	102	157	—	259	641 6 6

Accounts.—Finally, a word may be said about the accounts. These are made up at Michaelmas, and have been audited since the start by a firm of chartered accountants, and a professional valuation has been made each year since, and including, 1913. *The farming capital* rose from £2,325 19*s*. 6*d*. in 1912 to £4,017 0*s*. 7*d*. in 1917. *Feeding stuffs* cost £265 6*s*. 5*d*. for the first complete year, and £443 11*s*. 2*d*. for the last. *Artificial manures* cost £562 5*s*. 1*d*. in the first 21 months

Valuation and Purchases; and Sales and Valuation of Sheep and Cattle.

Stock.	Year ending Michaelmas.	(1)			(2)			(3)			(4)			(5)			(6)			Difference between 3 and 6.		
		Valuation at Beginning.			Purchases			Total of 1 and 2.			Sales			Valuation at End.			Total of 4 and 5.					
		£	s	d	£	s.	d.	£	s	d	£	s.	d	£	s.	d	£	s.	d.	£	s.	d.
Sheep ..	.. 1911 (from Feb. 8)	—			400	17	3	400	17	3	98	2	9	379	4	9	477	7	6	76	10	3
	1911–12	379	4	9	268	15	0	647	19	9	596	7	4	282	13	0	879	0	4	231	0	7
	1912–13	282	13	0	181	5	0	463	18	0	511	13	10	282	3	0	793	16	10	329	18	10
	1913–14	282	3	0	575	3	8	857	6	8	683	14	9	497	13	0	1,181	7	9	324	1	1
	1914–15	497	13	0	—			497	13	0	285	2	9	785	13	0	1,070	15	9	573	2	9
	1915–16	785	13	0	11	0	0	796	13	0	639	17	2	720	0	0	1,359	17	2	563	4	2
	1916–17	720	0	0	—			720	0	0	652	6	7	726	10	0	1,378	16	7	658	16	7
Cattle ..	.. 1911 (from Feb. 8)	—			357	14	6	357	14	6	—			464	10	0	464	10	0	106	15	6
	1911–12	464	10	0	82	18	6	547	8	6	183	4	3	708	0	0	891	4	3	343	15	9
	1912–13	708	0	0	39	13	0	747	13	0	220	5	0	1,120	3	0	1,340	8	0	592	15	0
	1913–14	1,120	3	0	247	3	0	1,367	6	0	965	10	0	855	15	0	1,821	5	0	453	19	0
	1914–15	855	15	0	33	9	0	889	4	0	324	5	0	1,421	10	0	1,745	15	0	856	11	0
	1915–16	1,421	10	0	44	12	0	1,466	2	0	777	6	4	1,527	0	0	2,304	6	4	838	4	4
	1916–17	1,527	0	0	67	12	0	1,594	12	0	1,703	15	0	1,436	10	0	3,140	5	0	1,545	13	0

(including 200 tons basic slag, £472 15*s*.), while in 1917 they cost £181 2*s*. *Wages* (including manager's salary) were £449 14*s*. 11*d*. for the first 21 months (say at the rate of £257 a year), while in 1917 they were £449 2*s*. 2*d*. In the former period the first carter had 17*s*. 11*d*. per week, and the shepherd 23*s*. 2*d*., whereas in 1917 the respective earnings were 26*s*. 3*d*., and 32*s*. 5*d*., with free house, manured garden, milk at 8*d*. per gal., and certain other extras. *Occupier's rates and taxes* averaged £31 15*s*. 3*d*. in 1911–12; in 1917, £78 4*s*. 1*d*. was disbursed under this head.

The sales, which were almost entirely confined to cattle, sheep, and grain, have already been dealt with.

The net financial result in any year was very largely a question of weather. In 1911, there were only two slight showers between 3rd May and 16th June, while the rainfall of July was only 0·37 in. In 1912, the weather conditions were even worse. Rain was measured only on four days between 23rd March and 6th May, and showed the perfectly negligible quantity of 0·08 in. The April of that year was, in fact, the driest ever recorded in the south of England since observations were started in London in 1729. The rainfall at Poverty Bottom in that month was only 0·06 in. May was also a very dry month, while in August rain fell on every day save three, the precipitation in that month being 6·58 in. The result was an adverse balance in both years

In 1913 the meteorological conditions were fortunately reversed. In that year there were frequent showers from the beginning of March to the middle of May, while the period from the middle of July to the 26th of August was ideal for harvesting. As a result, a fair profit was shown in that year.

1914 produced the wettest March recorded in London since observations were started at Camden Square 57 years before. Then the weather dried up, and only 1·72 in. of rain fell at Poverty Bottom between 5th April and 22nd June. In these circumstances it is not surprising that oats produced only two-thirds of the yield of the previous year, while the root crop was half a failure. The result in that year was a considerable loss.

The winter months of 1914–15 were the wettest for at least a century, March was very dry, April was showery, while May was very wet (4·14 in. rainfall). August and September were almost perfect harvest months. As a result of these favourable conditions, helped by some rise in prices, a substantial profit was revealed at Michaelmas, 1915.

1916 was perfectly ideal for farming on the South Downs. Rain fell on 12 days in April, 13 in May, and 16 in June; while not a drop fell from 23rd July to 13th August. The result was that all crops were good (see p. 1198) and a satisfactory profit resulted.

The spring and autumn of 1917 were very trying. No rain fell from 18th April to 13th May, while in August there were only 11 dry days, the rainfall, of that month being 6·51 in. The threshing results are not yet to hand, but they are likely to show a considerable drop in yield as compared with that for 1916. On the other hand June, with 4·31 in. of rain, and July with nearly 3 in., secured abundant "keep" on the Down pastures, and a good crop of roots. Helped also by better prices, the year showed a profit.

Financial Results.—The financial results for the whole period may be summed up in this way. After deducting losses, and allowing for rent (taken to be 4 per cent. on the landlord's capital, *plus* tithe rentcharge, interest on a Land Improvement loan, and a small way-leave) a credit balance of £2,233 1*s.* 10*d.* remains. From this there falls to be deducted the return of, say, 5 per cent. that would have been got without any exertion had the farming capital been invested in a good industrial security. This sum amounts to £886 13*s.* 2*d.*, which, deducted from £2,233 1*s.* 10*d.*, leaves £1,346 8*s.* 8*d.* Assuming that a farmer were prepared to do as much manual labour, and attend as closely to his business, as the manager of Poverty Bottom, we may add to this last sum the whole of the payments that the manager has received, namely £909 19*s.* 11*d.*, making a total of £2,256 8*s.* 7*d.* If this be divided by six years and 35 weeks, the period covered by the accounts, *we get £338 as the average yearly remuneration of the farmer, together with a free house.* In view of the fact that the farmer would have had to find some £4,000 of capital, which would have been invested in a business so dependent on the weather and other vicissitudes as agriculture, it does not seem that his reward is in any way excessive, and many may doubt if it is even sufficient. It is probable that the capital value of the farm has been somewhat increased by the "continuous good farming" of the past seven years, but this indefinable profit is one in which a farmer would not share.

While an endeavour was made to introduce reasonable intelligence into the business, and capital was freely provided where it seemed to be required, it is not doubted that some farmers would have shown better results, just as there are many who would have shown worse. The place was not taken in hand either for pleasure or profit. Had these been the objects, some other place than Poverty Bottom would have been selected. The object was to ascertain, on a commercial scale, what national advantages would be likely to accrue from the judicious expenditure of capital on some of the poorest land in England. As a result it is hoped that it has been proved that the produce of such land can be greatly increased, and that, in effecting this increase, capital and labour may look for a reasonable return. Crops on thin, chalky soil in the south-east of England, however, are very dependent on abundant rain in April and May. If all goes well in this respect good crops and good profits can be secured; but from the profits of favourable years provision must be made for financing the lean years that seem to be inevitable

THE QUALITY OF AGRICULTURAL SEEDS:

REPORT FROM THE OFFICIAL SEED TESTING STATION AT THE FOOD PRODUCTION DEPARTMENT OF THE BOARD.

IT is felt that a useful purpose may be served by giving a short account of the quality of the seeds likely to be available to the farmer during the present agricultural season. Up to 4th February tests had already been completed on over 2,400 samples received at the Station from all parts of England and Wales, and the figures given in this Report may therefore be taken as a fair index of the standard of the more important seeds. It must be remembered, however, that shipments of various seeds for use during the current season are still arriving, and, consequently, the tests on which this Report is based are not representative of all the grades of seeds that will ultimately be placed at the disposal of farmers.

CEREALS.—Most of the cereals at present tested have been received from merchants who have already secured some of the best stocks of seed grown in the country; averages based on these tests would, consequently, give a false impression as to the quality of much of the wheat, oats and barley that is likely to be sown.

The following particulars are, however, of interest, and show the wide range in the quality of cereals this year.

Wheat.—That good seed wheat is obtainable is indicated by the fact that 47 per cent. of the samples tested germinated 95 per cent. and over, though 6 per cent. germinated less than 30 per cent., while samples germinating 10 per cent. and 12 per cent. were received. Many of the poorer samples were badly sprouted, and two samples were contaminated with " bunt."

*Barley.**—Much of the barley is of excellent quality ; 74 per cent. of the samples germinated 95 per cent. and over ; some very poor samples with germinations of 50 to 60 per cent. have also been received ; and 9 per cent. of the samples were badly contaminated with the spores of " closed smut."

*Oats.**—The germinations for oats are as follows :—

40 per cent. of the samples tested germinated 95 per cent. and over.
54 " " " " 80 to 94 per cent.
5 " " " " 61 " 79 "
1 " " " " less than 50 per cent.

The relative excellence of Scotch oats this season is indicated by the fact that none of those so far tested have germinated less than 80 per cent., and 57 per cent. of these germinated 95 per cent. and over. Some very badly sprouted samples have been received from the Western Counties.

Rye.—Only a few samples of rye have been received ; the germination ranged from 68 per cent. to 95 per cent.

PURITY IN CEREALS.—In the main, the samples received have been decidedly well cleaned ; a few very dirty samples of barley and oats (*e.g.*, purity 92 per cent. and 97·5 per cent.) have been tested. The commonest weeds met with are black bindweed, cleavers, wild radish, cornflower, charlock and wild vetches, and less frequently wild oat, dock, knapweed and soft brome grass (8 per cent. of wild radish was found in one sample).

Cereals must not, however, be judged by the ordinary standards of purity in respect of weed seeds, as the following examples indicate. A sample of oats showing less than ¼ per cent. of charlock was estimated to contain 10,000 seeds of this weed to the bush., which at an ordinary seeding of the sample to the acre would mean the introduction of some 40,000 seeds of this serious weed. A sample of rye with 1·8 per cent. of soft brome grass was estimated to contain 36,450 of these seeds per bush. ; thus 3 bush. of this sample would introduce over 108,000 seeds of soft brome to the acre. When it is realised that 1 bush. of rye-grass containing 1 per cent. of soft brome would only be responsible for the introduction of 30,000 seeds of this weed to the acre, it can readily be appreciated what would be the effect on a subsequent ley if only 1 per cent. of soft brome were to be introduced with the covering corn crop.

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* *Note added on 15th February.*—During the past ten days a large amount of very inferior barley and oats has been sent to the station by farmers, in marked contrast to the samples earlier received from the trade.

PULSES AND TARES.—The number of these samples so far received has not been great, although tares are now coming to hand at a considerably increased rate. Most of the Peas received are yearling stocks, and it is interesting to note that if well stored these may give germinations of 90 per cent. and upwards. Several poor samples with germinations of 35 to 56 per cent. have been tested, and these are frequently attacked by the *Bruchus* weevil. Some of the Beans have given excellent germinations, but samples have been received with germinations of about 40 per cent., many of the beans also showing evidence of having been attacked by *Bruchus* weevils.

The Tares or Vetches are on the average of decidedly poor quality, and several samples with germinations ranging from 12 to 26 per cent. have been tested; good samples are, however, on the market, for about one-third of the samples tested have germinated over 90 per cent.

The chief impurities in Peas, Beans and Vetches are broken seed, of which one sample of Vetches contained as much as 17 per cent. Both Beans and Vetches frequently contain the grain of cereals, rye and oats not unnaturally being very frequent in Vetches, while cleavers, corn-cockle, and wild radish are often met with in Vetches, and cornflower and field convolvulus are not uncommon.

ROOTS, CERTAIN FORAGE CROPS, AND CERTAIN VEGETABLES.—The germination figures in respect of these crops are set out in Table I.

TABLE I.—*Showing the Percentage of Germination of Root and some Vegetable Seeds.*

	Highest. Per cent.	*Lowest. Per cent.*	*Average. Per cent.*
Turnip	100	3	86
Swede	99	0	82
Rape	99	52	89
Kale	95	23	73
Cabbage	95	56	80
Mangold	256	2	141
Beet	156	13	88
Onion	100	4	76
Parsnip	80	2	51
Carrot	74	6	47

The number of samples so far tested in the case of Rape (25), Kale (25), Cabbage (25), Beet (20), Onion (25), Carrot (15), and

Parsnip (10), are not sufficient for the figures to be taken as representative of the stocks of seeds in the country, and in the case of vegetable seeds further supplies are yet to arrive from America, France, and elsewhere.

It is important that allotment holders and private gardeners should realise that vegetable seeds ought to be purchased with great care, since no declaration has to be made in respect of small quantities of these. Thus, 62 per cent. of the Beet samples germinated under 90 per cent. (a low germination for this multi-seeded fruit). Only 14 per cent. of the Parsnip samples gave a germination of over 80 per cent., whilst none of the Carrots so far received have germinated over 80 per cent.; 29 per cent. of the Parsnips and 42 per cent. of the Carrots germinated under 50 per cent., whilst Carrots, Parsnips, and Onions have been tested which have given germinations of under 6 per cent. On the average, the germination of the Onion appears to be better than that of Parsnip or Carrot, for 30 per cent. of the Onions have germinated over 90 per cent. On the whole, the germination of the Cabbage and Kale samples has been satisfactory, but a low capacity of growth must always be guarded against.

Mangolds.—That supplies of excellent Mangold seed are available is shown by the following figures :—

8 per cent of the samples tested germinated 190 per cent. and over.
27 ,, ,, ,, ,, 150 to 189 per cent.
26 ,, ,, ,, ,, 125 ,, 149 ,,
27 ,, ,, ,, ,, 90 ,, 124 ,,
12 ,, ,, ,, ,, under 90 per cent.

Farmers should, therefore, not be content with germinations of under about 125 per cent. in respect of this important crop. It is interesting to note that the great majority of the samples must this year have been yearling stocks, and therefore capable of excellent germination.

Turnip.—The position as to the turnip is well shown by the following figures :—

48 per cent of the samples tested germinated 90 per cent. and over.
35 ,, ,, ,, ,, 80 to 89 per cent.
14 ,, ,, ,, ,, 51 ,, 79 ,,
3 ,, ,, ,, ,, under 50 per cent.

One sample gave a germination of only 3 per cent.

Swede.—For swedes the figures are as follows :—

35 per cent. of the samples tested germinated 90 per cent.
34 ,, ,, ,, ,, 80 to 89 per cent.
28 ,, ,, ,, ,, 51 ,, 79 ,,
3 ,, ,, ,, ,, 50 per cent. and under.

One sample incapable of germinating was received.

The above figures for Turnips and Swedes indicate that good seeds are obtainable, but considerable care is necessary in the purchase of supplies.

Purity of Root Seeds.—It must not be supposed that root seeds are always pure, or that they never contain the seeds of weeds difficult of subsequent eradication, although, of course, since the root fields are, or should be, kept constantly under the hoe, these weeds are not so serious as in the case of cereals and seed mixtures. Black bindweed, cleavers and nipplewort are frequent impurities in roots, whilst docks are not uncommon.

Root samples may also contain up to 9 per cent. or 10 per cent. of dirt and broken seed. Purity in the case of Mangolds, Swedes, and Turnips has now, equally with grasses and clovers, to be declared under the terms of the Testing of Seeds Order.

GRASSES AND CLOVERS.—The figures for purity and germination in the case of grasses and clovers, and for hard seeds in the case of clovers, are set out in Table II.

TABLE II.—*To show the Percentage, Impurity, and Germination of the Grasses and Clovers and Hard Seed of the Clovers.*

	Impurity: Average Per cent.	*Germination: Highest. Per cent.*	*Germination: Lowest. Per cent.*	*Germination: Average. Per cent.*	*Hard Seed: Average Per cent.*
Perennial Rye-grass	1·6	95	36	78	—
Italian Rye-grass ..	1·3	96	46	76	—
Cocksfoot	6·0	95	22	69	—
Timothy	1·0	98	47	90	—
Meadow Fescue ..	4·0	99	12	55	—
Crested Dog's Tail ..	1·8	93	2	65	—
Red Clover	3·2	97	2	68	4
Alsike Clover ..	4·5	97	13	79	8
White Clover ..	9·8	98	14	74	8
Crimson Clover ..	2·4	97	71	84	—
Lucerne	1·5	95	55	82	6
Trefoil	0·9	98	10	70	1·5
Sainfoin	0·6	71	0	47	2

It is most important that purity in the case of grasses and clovers should not be judged merely by the percentage of impurity present. The impurity should be chiefly estimated by the injuriousness of the weed seeds present, and by the amount of the various grasses and clovers that are to be sown to the acre. Thus, in the case of Cocksfoot and Meadow Fescue a high percentage of impurity frequently consists of Rye-grass, and in White and Alsike Clover a high percentage of impurity is often due to Suckling Clover, plants which, although of much less monetary value than the species containing them, are not land-fouling weeds.

It cannot be too strongly insisted that it is the Rye-grasses (containing soft brome, Yorkshire fog, cat's ear) and Red Clover (containing dodder, docks, wild carrot) seeds which are usually sown in large amounts, and often contain considerable quantities of weed seeds that should be purchased with the greatest care in respect of purity. Alsike and White Clover should also be purchased with great care, since they frequently contain large amounts of sheep's sorrel, self-heal, and the small-flowered Geraniums, whilst Crested Dog's Tail is often responsible for the introduction of considerable amounts of Yorkshire fog, cat's ear, and soft crepis.

The following further particulars may be given in respect of the several species :—

Perennial Rye-grass.—

14	per cent. of the	samples	tested	germinated	90 per cent. and over.
38	,,	,,	,,	,,	80 to 89 per cent.
43	,,	,,	,,	,,	51 ,, 79 ,,
5	,,	,,	,,	,,	50 per cent. and under.

Thirty-seven per cent. of the samples contained 1 per cent. and over of injurious weed seeds, these weed seeds consisting for the most part of soft brome and Yorkshire fog. Several samples contained over 2·5 per cent. of these weeds, and one as much as 4·8 per cent. Other weeds of common occurrence were rat's tail fescue, cat's ear, and suckling clover. One sample was ergoted, and one contained yellow rattle.

Italian Rye-grass.—

10	per cent. of the	samples	tested	germinated	90 per cent. and over.
31	,,	,,	,,	,,	80 to 89 per cent.
56	,,	,,	,,	,,	51 ,, 79 ,,
3	,,	,,	,,	,,	50 per cent. and under.

Nineteen per cent. of the samples contained 1 per cent. and over of injurious weed seeds, these consisting for the most part of soft brome and Yorkshire fog; samples containing from 2·5 per cent. to 3·4 per cent. of injurious weed seeds were also received. Several of the samples contained over one-third of awnless seed.

Cocksfoot.—

3	per cent. of the	samples	tested	germinated	90 per cent. and over.
25	,,	,,	,,	,,	80 to 89 per cent
62	,,	,,	,,	,,	51 ,, 79 ,,
10	,,	,,	,,	,,	50 per cent. and under.

Four per cent. of the samples contained 1 per cent. and over of injurious weed seeds, these consisting for the most part of soft brome and Yorkshire fog. Other weed seeds commonly met with were buttercup, crepis, nipplewort, dock, and ox-eye daisy, and one sample contained yellow rattle. Several samples contained excess of perennial rye-grass—one up to 25 per cent.

It is interesting to note that the Danish samples averaged a higher percentage of germination than the others, the average of all the Danish samples being 73 per cent. (or 4 per cent. higher than the average of all the Cocksfoot samples received). Furthermore if one Danish sample containing a very high percentage of light seed is excluded, the average germination of the samples would have been 78 per cent.

Timothy.—

70 per cent. of the samples tested germinated 90 per cent. and over.
2 ,, ,, ,, ,, under 50 per cent.

None of the samples contained over 1 per cent. of injurious weed seeds. Most of the impurities contained in Timothy were seeds of alsike and other clovers and meadow grasses, although some of the samples also contained not inconsiderable amounts of sheep's sorrel and self-heal.

Meadow Fescue.—

16 per cent. of the samples tested germinated 90 per cent. and over.
36 ,, ,, ,, ,, under 50 per cent.

Twelve per cent. of the samples contained 1 per cent. and over of injurious weed seeds, these consisting for the most part of soft brome and Yorkshire fog; dock in small amounts occurred in 25 per cent. of the samples.

1 sample contained 36·5 per cent. of Cocksfoot.
1 ,, ,, 32 ,, Rye-grass.

The above figures suggest that supplies of Meadow Fescue are considerably below the average pre-war standard; three samples germinated under 20 per cent.

Farmers should take pains to obtain reliable seed, or for the present discard this grass from their mixtures.

Crested Dog's Tail.—

5 per cent. of the samples tested germinated 90 per cent. and over.
40 ,, ,, ,, ,, 51 to 79 per cent.
16 ,, ,, ,, ,, 50 per cent. and under.

Nine per cent. of the samples contained 1 per cent. or over of injurious weed seeds, the most frequently occurring weeds being soft crepis, cat's ear, Yorkshire fog, self-heal, nipplewort, and sheep's sorrel. Suckling clover is also often found in these samples in moderate amounts.

Several of the samples of Rye-grass, and Meadow Fescue in particular, received at the Station show evidence of having been attacked by various insects, suggesting that these samples had been in store for a considerable period, and were stocks carried over from previous years.

Red Clover.—No distinction is made in this Report between Red Clover and Cowgrass.

16 per cent. of the samples tested germinated 90 per cent. and over.
26 ,, ,, ,, ,, 80 to 89 per cent.
31 ,, ,, ,, ,, 51 ,, 79 ,,
27 ,, ,, ,, ,, under 50 ,,

Dodder in greater or less amount occurred in 34 per cent. of the samples. Three samples contained over 1 per cent. of this parasite, over 2 per cent. having also been met with. Injurious weed seeds as scheduled in the Testing of Seeds Order only occurred to an extent greater than 1 per cent. in 2 samples out of 300, dock in both cases being the chief contributor. Dock and wild carrot were, however, of frequent small occurrence in samples. Ribgrass and cut-leaved crane's bill were, of course, both abundant and frequently-occurring weeds.

The following figures in respect of Red Clover obtained from different countries are very significant and not a little disquieting :—

	Germination : *Highest.*	*Lowest.* *Per cent.*	*Average.*	*Hard Seed : Per cent. Average.*
Chilian Red	97	74	90	7
Canadian Red	96	66	86	—
American Red	95	69	85	—
*French	97	38	82	—
†English	95	2	56	3
†Welsh	70	34	53	—

* Including Brittany.
† Or at least sent to the Station as such.

Dodder occurred in 84 per cent. of the Chilian samples; 32 per cent. of the 70 samples sent to the Station as English Red contained weed seeds which strongly suggested that a part at least of the samples did not consist of seed harvested in England or Wales. Seven of these samples actually contained seeds of Chilian Dodder. Several yearling, or so-called yearling, samples gave germinations of less than 10 per cent.

It is evident from the above figures that a certain amount of blending of Red Clover is desirable if not absolutely necessary this year. Farmers, however, whose past experience has shown them that British-grown Red Clovers are the best for their needs, must be content with low germinations, and be prepared to add to the sowing per acre, and would be well advised to beware of "bold," bright samples. The above figures are an ample justification of the "Country of Origin" Clause in the Testing of Seeds Order, and should suggest to the farmer the advisability of his blending his own Red Clovers instead of leaving this entirely in the hands of his seedsman.

Alsike Clover.—

24	per cent. of the samples tested germinated	90 per cent. and over.
37	,, ,, ,, ,,	80 to 89 per cent.
29	,, ,, ,, ,,	51 ,, 79 ,,
10	,, ,, ,, ,,	50 per cent. and under.

Only 2 per cent. of the samples contained 1 per cent. or over of injurious weed seeds, but, out of 24 samples of Alsike and White Clover mixed, 7 contained over 1 per cent. of injurious weed seeds. The most commonly-occurring seeds in Alsike are Timothy (in Canadian samples), Trefoil (frequent, as also other clovers), and injurious weed seeds of a harmful nature; met with in moderate quantities, sheep's sorrel, may weeds, campion, dock, self-heal, ox-eye daisy, ribgrass; while seeds of thistle are also not uncommon, these occurring for the most part in North American samples.

White Clover.—

7	per cent. of the samples tested germinated	90 per cent. and over.
32	,, ,, ,, ,,	80 to 89 per cent.
57	,, ,, ,, ,,	51 ,, 79 ,,
4	,, ,, ,, ,,	50 per cent. and under.

Twenty-one per cent. of the samples contained 1 per cent. or more of weeds scheduled as injurious under the Testing of Seeds Order. The chief contributor under this heading, however, is yellow suckling clover, which of course, is not to be regarded as an injurious weed in the same sense as weeds of the "land fouling" order, such as dock, wild carrot, and sheep's sorrel. A high percentage of yellow suckling clover in an expensive seed like White Clover, however, detracts very considerably from the monetary value of samples.

Samples of White Clover contained very large amounts of the soft crane's bills, as much as 10 per cent. and sometimes nearly 20 per cent. of these seeds having been met with in samples; other harmful weeds very frequently met with and in moderate amounts are dock, campion, self-heal, sheep's sorrel, may weeds, field forget-me-not and ribgrass.

Twelve samples of *Wild White Clover* have been tested up to the present The average germination of these samples was 69 per cent., 83 per cent. being the highest and 34 per cent. the lowest. The hard seed averaged 13 per cent. High percentages of hard seed are, of course, frequently met with in Wild White Clover. It is characteristic of most of the samples of Wild White Clover to contain large amounts of yellow suckling clover, up to 30 per cent. of this impurity having been so met with. Suckling clover, of course, grows in conjuction with Wild White, but it must be remembered that suckling clover is of far less value than the Wild White, and when 10s. and upwards per lb. is paid for Wild White the farmer does not expect to be paying for considerable quantities of suckling clover.

Other characteristic impurities met with in Wild White Clover are seeds of plants such as bird's-foot trefoil, crested dog's tail, meadow grasses, bent, species of sedge and woodrush—all characteristic of old permanent pastures. Several samples of Russian White Clover received at the Station gave an average germination of 86 per cent.; the highest germination of these samples was 88 per cent. and the lowest 83 per cent. The impurities contained were apparently not very different from those met with from other sources.

Trefoil.—

24	per cent.	of the samples	tested	germinated	90 per cent. and over.
12	,,	,,	,,	,,	80 to 89 per cent.
48	,,	,,	,,	,,	51 ,, 79 ,,
16	,,	,,	,,	,,	50 per cent. and under

Several samples consisted of seeds with damaged embryos which were internally fractured, and instead of germinating normally the seedling leaves become broken away from the root; such seed would, therefore, be incapable of producing seedlings and cannot be counted among the germinable seeds.

One sample in husk was received; it contained an unusually high percentage of hard seed, namely, 13 per cent. None of the samples so far tested contained over 1 per cent. of injurious weed seeds. Externally-broken and badly-fractured seed is a very common impurity in Trefoil. The chief weed seeds are field madder, cut-leaved crane's bill, ribgrass and campion.

Lucerne.—

40	per cent.	of the samples	tested	germinated	90 per cent. and over.
40	,,	,,	,,	,,	80 to 89 per cent.
16	,,	,,	,,	,,	51 ,, 79 ,,
4	,,	,,	,,	,,	50 per cent. and under.

None of the samples contained over 1 per cent. of injurious weed seeds. Broken seed is a common impurity in Lucerne. Dodder was found in 7 per cent. of the samples. The chief weed seeds present were ribgrass, wild carrot, and ox tongue.

Crimson Clover.—

40 per cent. of the samples tested germinated 90 per cent. and over.
None of the samples germinated less than 50 per cent.

This Clover and Trefoil contain far less hard seed than do the other Clovers and their allies. Dodder was found in one (French) sample. The chief weed seeds present were cut-leaved crane's bill, ribgrass and campion, with dock not uncommon.

Sainfoin.—

One sample tested germinated		80 per cent. to 81 per cent.
75 per cent	of the sanples tested germinated	51 to 79 per cent.
25	,, ,, ,, ,,	50 per cent. and under.

One sample proved incapable of germination. The samples so far received have been apparently clean, not more than 4 per cent. of Burnet having been recorded.

It is obvious from the above figures that good samples of Sainfoin are very scarce, and that great caution will have to be exercised in the selection of this important seed.

CONCLUSIONS.—It is evident from the foregoing particulars that there will be a large amount of low-grade seed offered to farmers this season. This is particularly so in the case of Red Clover, Sainfoin and Meadow Fescue, which would seem to be considerably below the average of normal seasons.

Purchasers should, therefore, pay considerable attention to the declarations under which seed is offered, and great care should be taken in the selection of samples. Good seed in moderate quantity is available in the case of the more important crops, and if the farmer is unable to obtain satisfactory samples locally or from the sources to which he is accustomed, he should not consider it too much trouble to look further afield for his supplies.

This applies with particular force to seed grain; it is not in the national interest to make large sowings of, say, Oats with a germination of 70 per cent. when first-class samples with germinations of over 90 per cent. may be obtained.

The figures given would suggest that there should be no excuse for sowing inferior seed barley; that there are considerable stocks of good seed oats on the market, but these are likely to be quickly taken up. Special attention should be paid to the choice of spring wheat, the question of variety (see Special Leaflet No. 49) being of supreme importance.

Orders for all seeds should be placed at once in order that delay in transit may not cause serious inconvenience, and that, if necessary, tests may be made on doubtful samples before the seed is sown.

In conclusion it must be emphasised that the farmer who now employs worthless or land-fouling seed has only himself to blame, and that he who does so is acting contrary to the interests of national food production.

Particulars as to the Testing of Seeds Order, 1917,* and directions as to sending samples† to the Seed Testing Station, are given in F.P. Leaflet No. 18, and some further information relative to economy in the use of seed grain‡ is given in F.P. Leaflet No. 26.

PIG-FEEDING IN WAR TIME.

TONNAGE for the importation of concentrated feeding stuffs is short; cereals are badly wanted for human food; and the home supply of milling offals has been reduced. First call on such feeding stuffs as are available must be reserved for working horses and cows producing milk for human consumption. The supplies then remaining make it quite impossible for pig-keeping to be conducted on the lines and in the manner followed in the past. For the present, pigs must rely chiefly on roots, small and damaged potatoes, green forage and waste materials.

It is estimated that the supplies of concentrated foods—cakes, meals, milling offals, cereals (tailings and damaged grain), beans, peas, brewers' grains, etc.—available for pigs from the end of January to the end of August are as follows:—

Boars and Sows	4 cwt. per head.
Young and Store Pigs	1 „ „

These quantities cannot be exceeded without endangering the lowest possible requirements of working horses and milking cows.

The question now in pig-feeding is: How far can vegetables replace meals?

In its natural state the pig finds the whole of its living out of doors, feeding on all that it can get in the woods and fields.

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* See also *Journal*, December, 1917, p 1031.

† See also *Journal*, January, 1918, p 1070.

‡ See also *Journal*, December, 1917, p. 994.

Domestic breeds have been developed for indoor feeding, but many successful pig-keepers maintain herds mainly in the open, and there can be no doubt that this system of management should be widely adopted at the present time. For a while at least the nation must forego fat pork and fat bacon, and be content with the leaner and more slowly-matured meat produced under natural conditions.

It is urgently necessary that no effort should be spared to secure the greatest amount of pork possible under existing conditions, and it is, therefore, the patriotic duty of everybody, so far as circumstances permit, townsman as well as countryman, to contribute his share to this object.

There are two main classes of pig-keeper to be considered: (1) the farmer, (2) the allotment holder or owner of a garden. The chief duty of the first is to breed and feed pigs and to supply stores to the second, who, as a rule, can only feed. It should be the aim of every farmer first of all to produce the pig-meat required by his own household and by the men he employs and their families, and thus release supplies for consumption elsewhere. In addition, he must bear in mind the needs of those who cannot grow meat themselves, and do all that he can to eke out the present short supply. Pig-keeping on the farms will be dealt with in detail later.

PIG-KEEPING FOR ALLOTMENT HOLDERS AND GARDEN OWNERS.—The small pig-keeper will do well to pay special attention to the following conditions, which will largely affect the success of his operations :—

The essential conditions are :—

1. Selection of suitable type of pig.
2. Cheap but weather-proof sty with adequate ventilation.
3. Regular and sufficient feeding
4. Systematic collection of house refuse to cheapen cost of upkeep.
5. Plentiful supply of vegetable matter.

Type of Pig.—The small pig-keeper should select a pig of an early-maturing breed, such as the Middle White or its crosses. This is important. Pork, rather than bacon, should be the aim.

For making into pork, other breeds such as Berkshires, Large White, Lincolnshire CurlyCoated and Gloucestershire Old Spots are preferred by many pig-keepers, but the offspring of any good-quality sow of local breed crossed with one or other of the breeds referred to will generally answer the purpose.

A start should be made with a pig of about 8 to 12 weeks old. An extra shilling or two spent in a good pig will be amply repaid. It must be an animal with a vigorous constitution—a greedy, lusty fellow, active on his legs, lengthy and round in shape.

Housing.—No elaborate structure is necessary. The main essentials are comfortable and clean conditions, with a dry bed, suitable ventilation, and the absence of draughts. The foundation must be dry, and the sty should, if possible, face the south. In the higher parts of the walls openings should be provided through which the passage of air may be easily regulated, in order that the temperature may be kept as even as possible throughout the year. A cheap wooden erection would serve. or the walls may be built of brick or concrete, or wood on a brick foundation, and the building may often take the form of a lean-to. It should be high enough to obviate all difficulty in cleaning out. A roof of wood covered with thick tarred felt will suffice to keep out cold and wet. The floor is the most important part of the sty. Concrete is the most suitable material. This should be left rough, to afford a foothold. Part of the floor, sufficient to provide bed accommodation for the pig, should be covered with a movable wooden platform. Hard bricks also make a good floor. To ensure drainage the floor should slope gently to the front of the sty. The drainage should not be wasted, but should pass into some convenient receptacle, or into a sunk dung-pit for use in the garden with the pig's manure,

Bedding.—Where straw is not available, sawdust, dried bracken, grass and leaves make thoroughly efficient bedding. Every effort should be made to provide an abundant supply, especially in cold weather.

Collection of House Refuse.—Householders unable to keep pigs themselves may assist by setting aside edible waste material for the feeding of pigs belonging to other people. Where a number of people, either individually or in combination, *e,g.*, a group of allotment holders, erect a piggery, a trolley would be the best means for collection. The garden and kitchen will supply a considerable proportion of the animal's food. Refuse from butchers, poulterers, fishmongers, fruiterers, greengrocers, dairies, hotels, boarding-houses and other dwelling-houses. can similarly be turned into valuable meat. The necessary organisation and collection of waste material might well be undertaken by public bodies or by local corps of women or boys as voluntary war work.

If the material could be collected to convenient centres, farmers in the neighbourhood of towns would probably be glad to remove it to their farms. In a case reported in the *Journal* for January, 1918, it was found that the amount of kitchen waste per head in a household was from 1 lb. to 1½ lb. per week.

The refuse should be collected and used while fresh and sweet, and if it can be boiled or steamed first, all the better.

Dish-water or other refuse containing soda or salt should not be used, since these substances, if given in excess, are injurious to the animal's health.

Feeding.—For several weeks after weaning the pig should receive its food in a moderately sloppy condition, slightly warm if the weather is cold. The food may consist of kitchen waste boiled into soup, if practicable. A little coconut cake (soaked overnight), sharps, or dried blood may be added, if available. Palm kernel cake meal may also be introduced from about the 12th week.

The young pig should be fed regularly three times a day, the food being gradually increased, as much being given at each meal as the pig will readily clear up.

It is necessary that vegetable food should form the chief part of the diet at all seasons. Young grass from the wayside, weeds from the garden, and similar material will all be picked over by a young growing pig. In the dead of winter reliance must be placed chiefly on small potatoes, and on parsnips, turnips, artichokes, etc.

Acorns or beech mast may be introduced into the feeding at the later stage. (See Leaflet No. 291.)

Another important point to remember is the necessity of supplying a regular allowance of small coal or charcoal, or, failing these, earthy turf.

An experiment* recently conducted in London shows that excellent pork can be produced from kitchen waste. About 7 lb. of waste were required to produce an increase of 1 lb. live weight, the pigs putting on weight at the rate of about ½ lb. per day.

Whey is also useful and, when obtainable, should be included in the pig's diet.

PIG-KEEPING ON FARMS: OUT-DOOR METHODS.—Pig-keepers who have access to grazing or wood lands should give the fullest trial to out-door feeding methods.

The following advantages are claimed for the out-door system:—

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* *Journal of the Board of Agriculture*, January, 1918, p. 1107.

1. A great saving of meal is effected.
2. Breeding sows are more prolific and much hardier than those kept in sties.
3. The young are bigger and hardier than sty-bred pigs.
4. Pasture is improved by pig-grazing.
5. Valuable food material such as acorns, often wasted, is turned to useful account.

Green food alone will not as a rule fatten pigs, but it will take the place of one-third or even of one-half of the grain necessary to add 1 lb. of live weight. Mature pigs, thin in flesh, may be expected on good forage, without grain, to put on about ½ lb. daily. But, for the average store pig, suitable green forage will do little more than provide a maintenance diet, leaving the increase of weight to be produced by whatever extra food can be supplied. With the help of the concentrated foods available an average increase per pig per day of about ½ lb. should be expected.

Barren sows have actually been fattened on good pasture without any supplementary foods, and palatable pork can also be produced under the same conditions. It is necessary that pigs should be accustomed gradually to the out-door life. Early spring farrows would appear to be best suited to summer grazing: and if born out of doors, or turned out with their mothers while quite young, they will become accustomed to nibbling grass while not dependent upon it for sustenance, and will thrive all the better when ultimately weaned.

Full use should be made of the sow's milking powers, and the young pigs should not be weaned till the sow has completely dried up, usually in about 11 to 12 weeks' time when she is on grass.

Farmers should aim at having as many pigs as possible ready to turn on to good clovery pasture in May and June. Early-maturing pigs will make good progress up to harvest with a minimum of meal, and the best of them may be fit to sell as porkers directly off the pastures. The others could be quickly fattened off with a few weeks' sty-feeding on "tail" corn, small or damaged potatoes and roots.

While there is at present no regulation preventing a farmer using his own home-grown potatoes for his own pigs, this should **not** be done if the potatoes are needed for human consumption.

The growing of special forage crops for folding with pigs or for "soiling" is not to be recommended at present, in view of the necessity of using arable land for the cultivation of cereals. Clover, lucerne or ordinary pasture will provide the best grazing crops for pigs under present circumstances. In grazing lucerne care must be taken not to overstock it. The number of animals should be regulated to allow two or three cuttings yearly. Over-pasturing without mowing injures the crowns of the lucerne plants. The cut lucerne may be made into hay and fed to pigs during the winter along with other foods. Pig-grazing might be more generally practised in standard orchards.

Before turning pigs on to pasture they should be ringed. They may be folded or allowed to run at large. Folds should not be too small, or the pigs tend to deposit their manure mainly on the boundaries.

Fencing is of course a difficulty at the present time: it may, however, be worth mentioning that, in the event of pigs "nosing" under a fence, a barbed wire fixed close to the ground will prove a sure deterrent. Two strands of barbed wire fixed 6 in. and 15 in. respectively from the ground have been known effectually to confine all pigs. Hurdles are suitable for folding.

No hard and fast rules can be laid down for the guidance of pig-keepers in selecting a suitable type for grazing. Pedigree stock of probably all the breeds will soon adapt themselves to an out-door life, but for general purposes a good quality sow of the local breed, crossed with a boar of an early-maturing breed, such as the Middle White, will usually prove satisfactory.

FEEDING.—(1) *The Sow.*—Under present conditions of shortage more sows should farrow from March to June than in autumn. The reason is simple. Sows farrowing in late spring can be kept largely on green food; sows farrowing in late autumn would make too large a demand on the small supplies of winter feeding stuffs. Autumn litters, therefore, must for the present be discouraged, and sows must be fed cheaply through the winter, mainly on roots and clover or lucerne hay. Those who can keep sows cheaply in autumn and winter should arrange so that the majority will pig down in the spring.

It is the greatest mistake to slaughter sows; there are too few of them already, fewer by far on the average than the German farmers, under much worse conditions, are able to keep. As many as possible of the young gilts (8 weeks old in January, February, March and April) should be kept on or sold for breeding. They could be run cheaply on grass and stubble, and put to the boar in November, December, January and February so as to pig down in March, April, May and June.

Here it is important to remember that young sows require more meal than old sows ; they have, as a rule, smaller litters, and their piglings are lighter at birth. This is a strong argument against thinning out the older sows.

It is already a fairly common practice to allow "dry" sows to pick up their living out of doors ; they should have some shelter, either trees and hedges, or rough huts made from wood faggots, or hurdles stuffed with straw or bracken. They should usually be brought home to farrow, and during the suckling period, and until grass becomes plentiful, it will be necessary to allow them a proportion of meals. The supply available will permit of the use of 4 lb. per day for 10 weeks : the remainder, namely, 1 cwt. per head, will have to be distributed over the period ending 31st August next.

In summer and autumn sows will do well enough on pasture and on such gleanings as may be picked up in the form of acorns and fallen grain. Any meal available for the winter months should be eked out by acorns, potatoes, roots, clover and lucerne hay. The hay may be fed in racks or it may be chaffed and steamed and mixed with pulped roots. Silage would also be a useful form of winter diet.

(2) *The Boar.*—Sound health and great vigour are essential in a boar. To maintain this he must be allowed sufficient exercise. After weaning he may be allowed to run out with other pigs until about 5 months old. After this age is reached he should be removed from the company of female pigs. When ready for service he should be confined to a roomy yard or a small paddock. The feeding and care of the boar should be on the same lines as those followed with the sow. His food may consist mainly of grass, clover, lucerne or tares in summer, and roots, potatoes, and clover hay in winter. When he is not being much used green food alone will be sufficient, but when his services are much in demand, he will require about 3 to 4 lb. per day of meals, which should include a little bean meal, if it can be obtained.

(3) *Store Pigs.*—A careful review of recent British experiments, in which 200 pigs were fed exclusively on meals until they weighed up to 300 lb., shows that on an average 4½ lb. meal were required to produce 1 lb. of live weight. But the record of 100 of these pigs, until they weighed up to about

180 lb., showed a gain of 1 lb. live weight at a cost of only 3½ lb. of meal.

Thus the lower weights are clearly the more economical, and this point should be borne in mind in connection with the methods of feeding now suggested. It must, however, be remembered that only about 1 cwt. of meal per pig can now be allowed—about one-fifth of the quantity ordinarily used to bring pigs up to about 180 lb. live weight. The question as to how this greatly reduced quantity can be fed to the best advantage will depend upon circumstances. Newly-weaned pigs will require more meal in proportion to their weight than older pigs, which are better able to digest the coarser vegetable food. Again, just before killing, a certain amount of meal will improve the "finish" of the pig. In the interval, meal may have to be entirely or almost entirely dispensed with, and the pigs compelled to find their living in the pastures, in the corn, pea and bean fields after harvest, and in mature woods when these are available.

In the winter months their food will consist almost entirely of small and damaged potatoes, roots, acorns and chaffed clover hay. These should be boiled together, mashed and mixed with such meal as may be available. Where practicable, pigs should be allowed to run in the yards with bullocks, with a view to their picking up the "gleanings" which may be found there.

THE USE OF DAIRY BY-PRODUCTS.—*Separated milk* should be used as human food or for the rearing of calves. *Buttermilk* free from salt is fully equal to skim or separated milk in the feeding of pigs, but is less suitable for calves: it is specially valuable for the young growing pig. *Whey* differs essentially from separated milk and buttermilk, in that it contains practically no fat nor albuminoid; the solids in whey are mostly sugar. It is better adapted for feeding to pigs than to calves. For pig-feeding its value is about half of that of skim milk or buttermilk.

RELATIVE VALUE OF FEEDING STUFFS.—As a guide in the selection of supplementary foods for pig-feeding, the following figures, mainly based on the practical feeding trials of Hansson, may prove useful. They are given for the general guidance of the pig-feeder in considering how foods previously used and now largely to be excluded can best be replaced. Most of the figures relate primarily to dairy cows, but they may be considered fairly reliable for other classes of stock:—

	Lb. of Food equal to 10 lb. of Barley.		*Lb. of Food equal to 10 lb. of Barley.*
*Barley	10	*Separated milk	60
Wheat	10	Buttermilk	60
Oats	12	Whey	120
*Maize	9½	Mangolds	90
Peas	10	Carrots	80
Beans	10	Swedes	100
Earthnut cake	8	Turnips	125
Linseed cake	9	*Potatoes	40
Coconut cake	9	Clover hay	22
Palmnut cake	10	Lucerne hay	25
Wheat bran	12	Green clover	70
Gluten feed	9½	Green lucerne	75
Dried yeast	8	Pasture grass	93
Dried grains	13	Silage (oat and vetch)	100
Malt culms	13		

* Confirmed in experiments with pigs conducted by the Department of Agriculture and Technical Instruction for Ireland.

SUMMARY.—The general changes necessary to meet present conditions are :—

1. An increase in the number of pigs kept in the open.
2. Greater use of natural foods, grass, clover, vetches, etc., during the summer.
3. The main effort must be to produce healthy store pigs in summer, suitable for consuming the large amount of waste green-stuff available in the autumn, and for fattening mainly on damaged potatoes and root crops in the early winter.
4. During the late winter and early spring months fattening pigs should be kept in proportion to the food available. During the War, grain and concentrated feeding stuffs must be scarce ; the food of the pig during this period must consist chiefly of small and damaged potatoes, roots, household waste, slaughter-house refuse, and other materials unsuitable for human food, with a small ration of concentrated food. It is better policy to limit numbers to those which can be properly fed between January and April than to attempt to maintain a large stock of stores during these months, for during this season fat meat is liable to be much needed.
5. On dairy farms separated milk should not be used for pig-feeding during the winter ; it is best employed direct as human food or in calf-rearing.
6. Where whey is available it should be used in pig-feeding.
7. An increase in number of sows farrowing March to June ; a decrease six months later.

NOTE.—*This article is also issued as Food Production Leaflet No. 19 (revised).*

THE POTATO CROP OF 1918.

THE President of the Board of Agriculture calls the special attention of farmers to the arrangements made by the Food Controller as to the prices to be paid for potatoes grown this year, as set out in the Memorandum which is printed below.

It is of urgent national importance that the potato crop this year should be the largest possible. The prices have been arranged in order to stimulate increased production. Mr. Prothero believes that the new scheme offers considerable advantages to growers, and secures them returns which will not only cover their costs but will also leave a reasonable margin of profit.

The following points in connection with the scheme should be specially noted :—

1. In order to secure a large increase in the area under potatoes, farmers who can grow an acreage greater than that grown in 1916, and not less than that grown in 1917, are offered the opportunity of entering into definite contracts with the Food Controller at remunerative prices.

2. Up to the end of October growers are allowed a free market. But if special circumstances arise which necessitate the fixing of maximum prices, in that case the maximum prices will *not be less* than those stated in Paragraph 4 of the Memorandum.

3. From November onwards growers will be relieved of any doubt or responsibility as to the disposal of their crop. It will be taken over and paid for by the Government at prices which will *not be less* than those set out in Paragraph 2 of the Memorandum. These rates are in fact calculated for that class of potato which commonly fetches the lowest price in the market. If the yield of the whole crop, or the crop of any well-defined potato district, is a partial or complete failure, the minimum rates for such districts will be proportionately raised. A rate higher than these minimum prices will also be paid for potatoes of better quality.

4. This scheme appears to Mr. Prothero to be far more satisfactory, from the farmer's point of view, than the arrangement in force last year, in the following points :—

(*a*) Last year a price was guaranteed but no market. This year the farmer is assured of both.

(*b*) The price varies according to the time of delivery.

(*c*) The price varies according to the quality of the potato and the locality in which it is grown.

To show how paragraphs 1 and 3 above will work, the case of a farm of 100 acres may be taken, of which 10 acres were under potatoes in 1916 and 15 acres in 1917. If 20 acres can be planted with potatoes in 1918 the farmer will be entitled to contract with the Food Controller under Paragraph 1 of the Memorandum for the sound ware potatoes grown on 10 acres, and those grown on the remaining 10 acres will be taken over by the Food Controller on the terms indicated in Paragraph 2 of the Memorandum, in so far as they have not been disposed of by the farmer before 1st November.

If 15 acres only are under potatoes in 1918, the farmer will be entitled to make a contract for five acres. If he can only grow 14 acres he will not have the advantage of the contract arrangements, but the whole crop remaining on 1st November will be taken over at the prices set out in Paragraph 2 of the Memorandum.

Mr. Prothero therefore urges upon farmers that they will not only be doing a national service by increasing largely the acreage under potatoes but that they can do so with the prospect of a reasonable profit.

At a time of such food scarcity as we shall have to face the potato is the most valuable food crop that can be grown. We cannot have too much of it in England and Wales. The large crop of 1917 will not be too great for our requirements. Next season the consumption per head of the population will be greater and the supply of food for live stock must also be considered. It is therefore of the utmost importance that special efforts should be made to increase the crop to the maximum possible.

Memorandum of Arrangements for the 1918 Potato Crop in Great Britain.

THE Government consider it a matter of urgent national importance that every effort should be made to secure the largest possible acreage under potatoes in 1918. In order to further this object, Lord Rhondda, with the concurrence of the Board of Agriculture and Fisheries of England and Wales and of the Board of Agriculture for Scotland, makes the following announcement :—

1. With a view to encouraging the maintenance of the 1917 acreage under potatoes and the breaking up of further areas of grass land, the Food Controller will be prepared to enter into contracts with farmers for the delivery (as and when required) of approved varieties of main crop potatoes on the following special terms :—

Time of Delivery.	*England and Wales.*	*Scotland.*
1st November, 1918, to 31st January, 1919.	£6 f.o.r. (or f.o.b.).	£5 10*s*. f.o.r. (or f.o.b.).
1st February, 1919, to 30th April, 1919.	£6 10*s*. f.o.r. (or f.o.b.).	£6 f.o.r. (or f.o.b.).
1st May, 1919, to end of season ..	£7 f.o.r. (or f.o.b.).	£6 10*s*. f.o.r. (or f.o.b.).

The above terms will apply only to sound ware potatoes grown on acreage in excess of the total acreage under potatoes on the same farm or holding in 1916, and will be subject to the following special conditions :—

(*a*) The total acreage under potatoes on the farm or holding in question must not be less in 1918 than in 1917.

(*b*) Any directions issued by the Board of Agriculture regarding spraying, harvesting and pitting must be duly carried out.

(*c*) Applications for contract forms must be made not earlier than 1st February, 1918, and not later than 1st May, 1918, and should be addressed to the Director of Vegetable Supplies, 94, Cromwell Road, London, S.W. 7.

2. As from 1st November, 1918, the Food Controller will purchase the entire crop of Great Britain, with the exception of—

(*a*) Potatoes grown on holdings including less than one statute acre of potatoes.

(*b*) Potatoes grown for the grower's consumption, or for consumption on the grower's farm.

(*c*) Potatoes grown for experimental purposes.

The purchase price will be eventually assessed with due regard to the size of the crop and to the quality of the potatoes, but for sound ware will be ***in any case not less than*** the f.o.r. (or f.o.b.) prices indicated in the following scale :—

Time of Delivery	*England and Wales.*	*Scotland.*
November and December, 1918 ..	£5	£4 10*s*.
January and February, 1919	£5 10*s*.	£5
March and April, 1919	£6	£5 10*s*.
May, 1919, to end of season	£6 10*s*.	£6

The prices for seed and undersized potatoes will be announced in due course, but every grower will have the right to retain any seed he may require for his own use.

3. Delivery in both cases is to be made as and when required, and price, weight and condition are to be determined in accordance with the scales set out above, as at the date when delivery is taken.

Subject to proper precaution having been taken, the Food Controller will bear the risk of damage other than normal wastage.

4. The Food Controller, as at present advised, does not propose to take over or fix prices for the 1918 crop before 1st November. If, however, for special reasons, *e.g.*, a partial failure of the crop or general shortage of foodstuffs, it becomes necessary in the national interests to fix any ***maximum*** prices, such maximum prices will not be less than those indicated below :—

1st to 15th July	£14 per ton.
16th to 23rd July	£12 ,,
24th to 31st July	£10 ,,
August	£8 ,,
September to October	£7 ,,

A separate announcement will be made at a later date as to the Irish crop.

The differential treatment given to Scottish potatoes reflects the desire of the Food Controller to relieve transport difficulties by putting the highest premium on the potatoes grown nearest to the principal consuming areas. It also follows the ordinary custom of the trade, and takes into account the fact that Scottish farmers obtain their seed cheaper and command a higher price for it than English farmers.

THE POTATO AS A WAR CROP.[*]

OF the crops, other than cereals, which exercise an important influence on the course of the War, the potato is the chief; indeed, in some ways the potato may be said to be the most important of all crops, for without it Germany could not have carried the War into the fourth year.

With the single exception of sugar beet, more human food per acre can be produced by the potato than by any other of our common cultivated plants, and whereas the sugar beet must go through a process of manufacture, and sugar, when produced, can only be employed as a relatively small component of a mixed diet, the potato may be used direct as a principal article of food. At the present time, *e.g.*, the potato forms from one-third to one-fourth of the diet of the German civilian population.

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[*] Further information on potato growing will be found in Leaflet No. 296 (*Potato Growing in Allotments and Small Gardens*); Leaflet No. 173 (*Potato Growing*); and Food Production Leaflet No. 11 (*Hints on Purchasing Seed Potatoes*).

The war uses of this crop have long been recognised in Germany, and the country grew a very much larger quantity of potatoes than was needed for the supply of the people. The crop was employed in stock feeding, all classes of stock, especially pigs, receiving potatoes as part of their regular winter food; to a less extent the crop was used in distilling, starch manufacture, and in the preparation of dried potatoes. After the outbreak of war there was a great shrinkage in the German supplies of cereals, and human food was secured by reducing live stock and providing more potatoes (especially in 1915 and during the present winter) for direct consumption.

In illustration of the important position taken by the potato among German food crops it may be stated that, before the War. while the average 100 acres of British cultivated land included less than 2 acres of potatoes the average 100 acres of German cultivated land included 10 acres.

Further, in illustration of the quantity of human food produced by the potato, the following figures may be given. The figures show the number of persons who could be supported for a year on the produce of 100 acres of the crops named. The crops are assumed to be average British crops.. In the case of potatoes two sets of figures are given showing the results if the crop were fed to people, as it chiefly is in Britain, or if fed half to people and half to pigs as in Germany before the War. It is, in all cases, assumed that the foods form part of a properly blended diet.

100 acres	potatoes support	420 persons.
50 ,,	,, used direct support 210 persons	255 ,,
50 ,,	,, fed to pigs support 45 persons	
100 ,,	wheat used direct* support	230 ,,
100 ,,	barley used direct* support	180 ,,
100 ,,	oats used direct* support	155 ,,
100 ,,	medium grass, producing beef	15 ,,

* Offals fed to cattle.

There has been a disposition in the past to underrate the dietetic value of the potato, and while admitting that it was a useful, cheap food, to regard its nourishing properties as low.

Those who have remarked the results produced by potatoes when used in combination with oatmeal by the Scottish or Irish peasantry have been sceptical as to the popular reputation of the tuber, and recent scientific work has shown that the nitrogen constituents of the potato have, in fact, a much higher dietetic value than has hitherto been supposed.

In public lectures given under the auspices of the German Council of Agriculture in Berlin in 1917, great claims were advanced on behalf of the potato as an article of diet, and as a substitute for butcher's meat ; but no experimental evidence in support of these claims was given, and it would be as unwise to exaggerate the food value of the potato as hitherto it has been to underrate it.

The disadvantages of the potato as a war crop are that it is bulky and calls for extra transport just when the railways are busiest ; that it does not keep well after April, and that when there has been much disease in the growing crop there is a heavy wastage even earlier in the year. To some extent, too, the crop is an uncertain one, but this is now much less the case than formerly owing to the number of varieties in cultivation. The 1916 crop was the only bad failure in recent years, and even in that season many districts grew quite satisfactory crops.

On balance, having regard to the ease of cultivation, the very high yield of human food produced, the quality of the potato as fodder for live stock if not required by man, its value as a cleaning crop, its suitability for planting on newly-broken grass land (especially on land too rich for corn growing), its usefulness for small fields in thickly-populated districts or near villages where sparrows would do great damage to grain, and the fact that a good crop may be secured in most parts of the country even if planted as late in the season as the beginning of May, the potato must be regarded as the most valuable of all our spring crops and, indeed, a close second to autumn-sown wheat.

The sowing of autumn wheat for the harvest of 1918 has been finished ; every effort must, therefore, be made to secure the largest possible acreage of the second best crop—potatoes.

SUGGESTIONS TO DAIRY FARMERS ON THE BREAKING AND CROPPING OF GRASS LAND.

THE maintenance of the milk supply is essential. At the same time, dependence on imported feeding stuffs must be reduced to a minimum. Dairy farmers, therefore, should so arrange their practice as to maintain their herds and render their holdings as far as possible self-supporting in respect of cattle food.

The following suggestions are offered to dairy farmers unused to cultivation who are now engaged in ploughing part of their grass land and preparing it for crops in 1918 :—

CROPPING ARRANGEMENTS.—In the case of land broken in winter and spring the following crops, in the proportions indicated, may be recommended :

Oats			20
Roots	Mangolds Swedes or Kohl-rabi Marrow-stem Kale or Thousand-headed Kale Cabbages or Maize		10
Beans		5	10
Vetch mixture		3	
Linseed		2	

Kohl-rabi would usually take the place of swedes in the south and south-east, and a small area of maize, say 1 acre, would be grown in these regions.

PREPARATION OF THE LAND.—**Oats.**—(1) *Drilling.*—Plough as early as possible, preferably with plough of digging type, and skim and disc coulter attachments. At seed time roll with ring roller ; double-harrow in the direction of the furrows ; cross-harrow twice, and if tilth is then fine enough and well consolidated below, drill the seed at the rate of 4 bush. per acre, and give a final harrowing. (A disc-harrow should be used before the ordinary harrow, and the seed should be sown with a disc drill, if such implements are available.)

(2) *Broadcasting.*—Plough as early as possible with a long-board plough and skim coulter, leaving a solid, crested furrow, and follow with a wheel press, if available. At seed-time harrow once in the direction of the furrows, then sow at the rate of 5 or 6 bush. per acre ; double-harrow along the furrows, then across, and finally in the direction of the furrows.

In both cases roll well, and repeat if necessary when the plant is 2 in. to 3 in. high. Cross-harrowing should not be practised if it disturbs or loosens the furrow and brings up turf.

Varieties.—Varieties that may be recommended are:—*Black Tartarian,* for black or peaty soils; *White Tartarian,* largely grown on chalky soils in the South Midlands; *Potato* and *Goldfinder,* noted for straw of fine quality, and suited to the colder districts. (As the latter is late in ripening it should be sown early.) *Record* and *Yielder,* for rich soils. (The latter ripens early.) *Abundance,* or variety of similar type, for average conditions.

Roots.—A choice of the following methods may be made according to circumstances and conditions:

1. Plough over turf 2 in. to 3 in. deep as soon as possible, cut up turf with disc-harrows and plough under deeply, using a skim coulter.
2. On free-working friable soils it may be sufficient to plough once deeply, using a skim coulter; in preparing the seed-bed the turf must not be brought to the surface.

Except, perhaps, in the wetter districts, the crops may be sown on the flat. As in the case of oats, operations should be directed to securing a fine top tilth and proper consolidation below.

Mangolds should be drilled during the first half of April, if possible, at the rate of 8 lb. to 10 lb. per acre. An ordinary corn-drill with some of the coulters taken out and with cups suitable for mangold seed may be used. The rows should be from 22 in. to 26 in. apart. After drilling it is important to roll the land well.

Swedes, Kohl-rabi, Marrow-stem Kale, Thousand-headed Kale.—The preparation of the soil is the same as for mangolds, and the rate of sowing is about 3 lb. or 4 lb. per acre. Kohl-rabi (preferably the short-topped green variety) is drilled in April. Swedes are sown in May and June; Marrow-stem Kale is sown from the middle of April till the end of June, and Thousand-headed Kale in March, April and May. The two last-named plants are usually more dependable than swedes in the southern and south-eastern counties and provide a large bulk of useful green forage for the early winter months. Thousand-headed Kale may also be drilled in July and August for use in the following spring from March onwards.

Cabbages.—Seed is scarce and must be used very sparingly. It is usual to make a seed-bed in March and transplant in the field, but in order to save labour and reduce the risk of loss through drought, the seed may be sown direct in the field at the rate of about 1 lb. of cabbage seed mixed with 2 lb. to 3 lb. of turnip seed per acre. The turnips can easily be separated from the cabbage at singling. Suitable varieties are *Early Drumhead*, *Early Market* and *Sheepfold.*

Maize.—The seed-bed should be prepared as for roots. About the end of May the land should be ploughed lightly so as not to bring up the turf, and the seed dropped in alternate furrows and ploughed in (or, if convenient, it may be drilled). *White Horse Tooth* is a suitable variety and the rate of sowing is about 2 bush. per acre.

Manures for Green Crops.—4 cwt. of superphosphate or 6 cwt. of basic slag per acre, applied during the preparation of the seed-bed, and 1 cwt. to 1½ cwt. per acre of sulphate of ammonia applied at seed time, or along the rows later, and worked into the soil. If the soil is in good heart, sulphate of ammonia may be reduced in quantity or omitted.

Spring Beans.—(1) Prepare the land as for roots; plough in seed about 4 in. deep in every third furrow, at the rate of 3 bush. per acre. The rows should be about 27 in. apart.

(2) On heavy land the seed may be sown broadcast in February (on top of the ploughed furrow) at the rate of 2 to 3 bush. per acre and roughly harrowed. Later, when the beans are beginning to sprout, 2 to 3 bush. of oats may be sown broadcast and the harrowing completed. A late-ripening oat or an oat from a late district should be selected in order that the crops may ripen about the same time. The oats will help to keep down weeds.

Vetch Mixture.—Prepare the land as for oats and sow broadcast the following mixture for cutting green or for ripening:—

1 to 1½ bush. oats.
1 „ 1½ „ barley.
1 bush. vetches or maple peas.
½ „ beans.

If wholly required for cutting green the mixture should be sown at intervals in February, March and April. If it is desired to make hay, the beans should be omitted.

LINSEED.—Prepare the land as for oats and drill from mid-April to mid-May at the rate of about 1½ bush. (78 lb.) per acre. La Plata or Plate linseed is best suited to seed production. From 8 cwt. to 10 cwt. per acre is a good average crop. Crushed linseed is specially valuable in the rearing of calves and for mixing with starchy foods in the feeding of dairy stock.

ESTIMATED PRODUCTION OF THE VARIOUS CROPS.—For the purpose of illustration, the case is assumed of a farm of 120 acres hitherto all in grass and now arable to the extent of 40 acres.

The total production of autumn and winter food on 40 acres, cropped as indicated, may be estimated to be as follows :—

Oats—20 acres	Grain 6 qr. per acre	120 qr.
	Straw 1½ tons per acre	30 tons.
Mangolds or other green crop—10 acres—20 tons per acre (average)		200 tons.
Beans—5 acres	Seed, 32 bush. per acre	20 qr.
	Straw, 20 cwt. per acre	5 tons.
Vetch or pea mixture—3 acres less 1 for soiling = 2 acres hay at 2½ tons		5 tons.
Linseed—2 acres at 9 cwt. per acre		18 cwt.

UTILISATION OF THE CROPS.—Assuming that 30 cows of 1,200 lb. live weight are kept, and that the average yield of milk per head per day during the winter months is 2 gal , the foods grown on the cultivated portion of the farm, plus meadow hay, if apportioned as follows would provide an adequate ration for 180 days, viz. :—

50 lb. roots		120 tons.
10 „ meadow hay		24 „
10 „ straw		24 „
7 „ oats and bean meal (in proportion of 3 : 1)	Oats 84 qr. Beans 18 qr.	102 qr.

The linseed and such vetch hay as might be available could be used for calf-rearing, the remainder of the oats for feeding to calves or horses and the bean straw for fodder or bedding.

NOTE.—*This article is also issued as Food Production Leaflet No. 29.*

THE POLICY OF THE AGRICULTURAL ORGANISATION SOCIETY:

CONFERENCE HELD ON 7TH AND 8TH FEBRUARY, 1918.

AT a Conference convened by the Agricultural Organisation Society and held on 7th and 8th February, the Chairman, Mr. Leslie Scott, K.C., M.P., said :—

" The occasion on which we are meeting to-day I regard as a great occasion in the history of British agriculture. History is of two kinds—past history and future history—and the greatness of this occasion lies in future history. I hope that from to-day onwards we may see the growth of a great development in the agricultural industry of this country, of combination—combination amongst farmers in order that they may really get command of their own industry, making the profits to which they are entitled and ensuring to the consumer of this country food at fair and reasonable prices.

" The Agricultural Organisation Society, which has convened this meeting, is the hand-maiden of British agriculture, whose duty it is to help the farmers of this country to organise so that they may be helped in carrying on their business to their own and the Nation's advantage.

" I am glad to tell you that I have just received a most encouraging letter from Mr. Prothero, the President of the Board of Agriculture, a letter which shows that he is in complete sympathy with the policy of the Agricultural Organisation Society, which policy has been framed by the Governors of that Society after consultation with the farmers who are members of the societies affiliated to it, as the policy which they believe is wanted by the farmers of the country.

This is what he says :—

" 'DEAR SCOTT,

" 'Farming is a business in which as in every other industry union is strength. Union also means cheaper production, and, therefore, increased net returns. As a unit of production ordinary-sized farms are handicapped in the commercial race by the smallness of their acreage. The advantages of union might be gained by throwing them together into large commercial holdings of many thousand acres, but it would be gained by sacrificing the individual independence, initiative and enterprise which agriculture values so highly and so justly. The easiest method of uniting is to join a co-operative society which secures to farmers the benefits of union and yet preserves to them the complete control of their own business.

" 'Every farmer should belong to a co-operative society. To illustrate one side only. If farmers bulk their orders they obtain lower quotations, larger discounts, and lower railway rates. But the society to which they belong must be strong and effective, either from its own reserve or from its association with more powerful bodies. Small societies, like small farmers, must co-operate. They must unite, and in obtaining this amalgamation or federation of the weaker associations the Agricultural Organisation Society will be a most useful mediator. The creation of an agricultural wholesale society offers immense opportunities. I should like to see it established and become financially strong.

" 'Farmers can make it what they like if they choose. I believe that the plans for the organisation of the Agricultural Organisation Society will enable farmers to govern its destinies themselves, and will enable a wholesale society of great financial strength to be established.

" 'The credit proposals which will be submitted by you are designed to supply a much-needed want of the agricultural community. The word " farmers " is intended to include all those who cultivate the land. In this sense allotment-holders are farmers, and I trust that the union of all cultivators of the land in this sense will help to bridge the gap between town and country. If it succeeds in doing this the Agricultural Organisation Society will confer an inestimable boon to all those who are interested in the farming community.

" 'Yours sincerely,

" 'R. E. PROTHERO.'

" As Mr. Prothero says, farming is a business ; and really, gentlemen, that is the theme upon which this meeting might well base the whole of its discussions. In it is involved the whole of our policy of organisation, for to-day the most ignorant amongst us knows that success in business under modern conditions is impossible without effective combination. It is only by combination that the costs of production can be reduced to a minimum ; it is only by combination that the market for the produce can be made the best and most economic use of. It is only by combination that the producer can bring his goods right to the consumer, saving the cost, often excessive, of the intervening middleman, and it is only by combination —and I want to repeat this—of the producers that the consumer can get his goods at the lowest price.

" I will illustrate it by a recent fact. The Wiltshire Dairy Farmers' Association is the biggest Dairy Farmers' Co-operative Society of this country. By organising they have been able so to reduce the cost of production and distribution as to be able to sell to the distributors in certain urban districts at so low a price that the recent restrictions made by the Food Controller of the amount of profit to be allowed to the wholesaler has left them untouched. Their price was already below the lowest at which those restrictions could affect them. In other words, they were selling at 1½*d.* cheaper than the average price at which milk was sold in those districts. That is an instance of the advantage to the consumer of the farmers combining for the purposes of their own business, and that instance, I am perfectly certain, is illustrative of what will happen throughout the length and breadth of the land if the farmers will only combine together. We have never in the history of this country had such an opportunity as we have to-day.

" Gentlemen, the reasons in favour of combination are obvious. *You* can if you like. *You* can persuade every farmer in this country—one or other of you in your various districts—to come in and join. *You* can extend your own societies, where necessary ; you can help us build new ones, if they are necessary in any district. Your societies can join together in the Central Wholesale Society. You can support the Agricultural Organisation Society, which is your servant—your servant for the purposes of carrying out that organisation.

"And then just think what the sphere of operations is, the possible field of activity. Let us look at one or two figures. Take the question of purchases made by the farmers of the country. Of feeding stuffs and fertilisers farmers of the country buy annually £24,000,000—these are pre-war prices. How much does the co-operative society of farmers buy out of that? They buy £3,000,000—one eighth. Why should you not be joined together and buy the whole amount through your own co-operative wholesale society? If you bought the whole, you would be buying on very much better terms. You would be saving all the discounts, all the railway rates and the cost of distribution, and you would be saving the middleman's profits. Where would they all go? Into your pockets.

"Take the other side of the account—the sale account. The crops produced in this country total about £147,000,000 or thereabouts. Out of that about £100,000,000 are consumed in one way or another on the farm, and £47,000,000 are sold in this country. What are the co-operative societies doing in that way? The co-operative societies sell something under £250,000 of those crops out of a total of £47,000,000.

"Why should not all that be done on sound business lines, saving in every way, getting the best price for the qualities sold, saving the middleman's profits, saving in the cost of distribution? Why not have command of your market from beginning to end, not stopping when the goods leave the farm, but carrying it through so far as existing conditions make it possible? Don't misunderstand me. I am not suggesting that here and now you should seek, for instance, to set up flour mills and supersede all the existing flour mills in the country. That is not practicable, but there is an enormous field open to us that is not already covered, if you would only combine. Now, can we combine? I am perfectly certain that it is possible, that where there's a will there's a way, and not only that, but am perfectly certain that we already know the way, and that the Agricultural Organisation Society and you together can get along that way quite quickly. Let me give you an illustration on an important point—how to get the farmers into the Society.

"The Wiltshire Farmers at the beginning of 1917 started a system of intensive cultivation of the district round their centre at Chippenham, put on two or three people to go round and see every farmer—big and little—in the district, and to interview every single man in expanding circles. How many refusals do you suppose they have had since the beginning of 1917? Gentlemen, I will tell you how many refusals, although they have seen every single man. They have not had one—not one. They had 600 members at the beginning of 1917, and about 1,000 at the end of 1917. If the Wiltshire Farmers' Society can do that, why can't every society represented in this room do it? I expect you are saying to me: 'You need not ask us, we are doing it.' I know in many cases you are doing it. Do it in all. So much for getting the farmers in. You have got to make them realise that it is to their advantage, the men who are out, that they should come in. You have got to do another thing—you have got to make every one of your members, who are in, realise that it is to their disadvantage to have the other men out. It is very much better to get them all in.

"Now, as regards combining societies together, there are two sides to deal with—the trading side and the organisation side. The proposals are proposals, in the first instance, to deal with the organisation side of the movement as apart from the trading side. In order that the Agricultural Organisation Society may be governed by you farmers, it is proposed to make a Board of Governors, elected representatives of the farmers, and in a nutshell, it is hoped to divide the country into fourteen branches or branch areas to be governed in each area by a Local Committee, elected by delegates of the Society in certain numbers. The branches are to be combined in seven provinces, and the delegates of the societies in the provinces are to elect the Governors of the Agricultural Organisation Society.

"Now for the trading side of the movement. We have had this morning a meeting of a number of managers and members of the Committee to have a sort of preliminary discussion. We have had a Committee sitting under the Chairmanship of Sir Owen Phillips, who is one of the greatest business heads of to-day, and proposals have been drafted for the formation of an Agricultural Wholesale Society on sound and strong financial lines.

"As Mr. Prothero says, it is of the highest importance that the movement should have a really strong Agricultural Wholesale Society on one condition—that it is managed by the farmers' societies themselves. It shall be their society. It shall act as their brokers or agents in making purchases and making sales of those articles which can be best bought and sold on wholesale lines on a large scale. I am glad to be able to report to you that the managers who were represented this morning, representing a turnover of societies well over £2,000,000, have agreed on this basis of subscription to begin with, that the societies should be asked to recommend to their committees that the subscriptions to the capital for the new Wholesale Society should be made on the basis of 3 per cent. on the turnover of the societies to be spread over five years —1 per cent. in the first year and ½ per cent. in each of the four following years, or, if they like, they can pay the whole in full at once.

"Now, gentlemen, I hope very much that you will see your way, when you come to the discussion of that matter, to adopting that proposal. It is the minimum possible financial support, in my view, for starting a sound wholesale society. I don't say that those actual details of the proposition are essential, but a sound financial position must be assured in order to make a successful start. That is obvious. and I am perfectly certain that you can save, in the long run, large sums per annum by having a strong wholesale society. If you do that you will then get command of the wholesale market, which will be of enormous value to every farmer in this country.

"Now, if you have your wholesale society you will then have not only a great advantage from the mere fact of a really efficient buying and selling wholesale agency, but, in addition, you will have means of providing credit both for the societies in their purchases from the wholesale and for the members in their purchases from their own societies, and, therefore, you will have a double reason for starting the wholesale, you will have a double advantage—if you can find the capital necessary to start the Central Wholesale Society.

"Now, gentlemen, there is only one other word I want to add. That is this. In order to cover the country successfully with good co-operative societies, local conditions will have to be considered. The same type of society is good and successful in one district, and not in another. Different districts like societies rather on different lines. My own view is that it is best, if you can, to have a large society doing all the different kinds of business that have to be done—buying requirements, selling produce, transporting and marketing it, hiring out machinery, dealing with live stock insurance, hiring out good bulls, boars, etc.—all these various things can be done by a good Agricultural Co-operative Society, and if that society is big enough, and is enabled to employ really first-class managers in the different departments of its business, then I am satisfied that the members, at their end, will get the best results out of their central society. I recognise that in certain districts farmers prefer to have a society for one purpose only, but all I say is this: we must feel our way, and let people find out by experience the best way of running the society and the best society to meet their needs. You must settle that in your way, and the Agricultural Organisation Society will try to meet all demands made upon us for assistance, but we have to cover the country, and we have got to get all the farmers in."

WILD BIRDS' EGGS.

ARRANGEMENTS having been made for the collection and marketing of the eggs of certain wild birds, with a view of augmenting the existing supply of staple foods, the Food Production Department think it desirable to publish short particulars which may enable collectors to recognise those eggs more readily. It will be understood, however, that the appearance of the eggs of any species of bird may vary widely, just as the members of a human family may differ in size, colouring, etc., and it is not possible to do more than indicate generally the more common characteristics.

The birds whose eggs are to be gathered are: Black-headed Gull (*Larus ridibundus*), Herring-Gull (*Larus argentatus*), Lesser Black-backed Gull (*Larus fuscus*), Greater Black-backed Gull (*Larus marinus*), Common Guillemot (*Uria troile*), Razorbill (*Alca torda*), and Puffin (*Fratercula arctica*). Probably every seaboard county of England and Wales, except Suffolk, has gulleries, but of the inland counties it is believed that there is a gullery only in Staffordshire, where the Black-headed Gull breeds. Nests of the last-mentioned are often found in inland localities and, as a rule, are readily accessible; and it is this bird which is expected to yield the bulk of the eggs put on the market.

The chief breeding-places in England and Wales are as follows :—

Carmarthen.—Black-headed Gull.

Cheshire.—Black-headed Gull.

Cornwall.—Herring-Gull ; Lesser Black-backed Gull ; Greater Black-backed Gull (on cliffs) ; Puffin.

Cumberland.—Black-headed Gull (Lake District, especially Ravenglass, near Wigton, Solway Flow and among the heather at Bowness) ; Lesser Black-backed Gull (very common on mosses and flows) ; Greater Black-backed Gull (Lake District and Solway Flow).

Denbigh.—Black-headed Gull.

Devon.—Herring-Gull ; Lesser Black-backed Gull ; Greater Black-backed Gull ; Razorbill ; Puffin.

Dorset.—Black-headed Gull (Poole) ; Greater Black-backed Gull (cliffs) ; Puffin.

Durham.—Black-headed Gull (moors).

Essex.—Black-headed Gull (coast).

Flint.—Black-headed Gull (Mold).

Lancashire.—Black-headed Gull (Walney Island, and Winmarleigh Moss, near Garstang).

Lincolnshire.—Black-headed Gull (Brigg and Twigmoor).

Lundy Island.—Herring-Gull ; Greater Black-backed Gull ; Guillemot ; Razorbill ; Puffin.

Isle of Man.—Lesser Black-backed Gull ; Greater Black-backed Gull ; Puffin.

Merioneth.—Black-headed Gull (Lake Bala).

Norfolk.—Black-headed Gull (Scoulton Mere).

Northumberland.—Black-headed Gull (Pallinsburn) ; Lesser Black-backed Gull (on moors).

Scilly Isles.—Herring-Gull ; Lesser Black-backed Gull ; Greater Black-backed Gull ; Puffin.

Staffordshire.—Black-headed Gull (Norbury and Aqualate Mere).

Islands off the Welsh Coast.—Lesser Black-backed Gull ; Guillemot ; Razorbill ; Puffin.

Westmorland.—Black-headed Gull.

Yorkshire.—Black-headed Gull (Skipworth Common, Locker Tarn Wensleydale, Browsholme Tarn and Grassington) ; Herring-Gull ; Razorbill and Guillemot (chalk cliffs from Speeton to Bempton, Flamborough Head) ; Puffin (Flamborough cliffs).

The Black-headed Gull makes its nest, sometimes a mere hollow lined with grass or weed, but often a bulky structure of flags and sedges, on swampy ground or on an island, and frequently on floating sedge or other water-plants. The eggs are laid towards the end of April. They are about 2 in. long, and 1·4 in. wide ; in colour, pale olive-green or olive-brown, blotched with black-brown and grey, but sometimes bluish-white without spots.

Some of the other species mentioned breed on cliffs not easily accessible, and are found particularly on headlands where there are suitable sites.

The Herring-Gull's nest, formed of a mass of herbage and seaweed, is placed on isolated rocks or clifts along the coasts, but sometimes on islands or on level ground. The eggs, laid in May, are about 2·8 by 2 in., stone-colour, olive-brown, or sometimes olive-green, spotted with brown and grey.

The Lesser Black-backed Gull makes a nest composed of a mass of grass and seaweed, or other plants ; sometimes merely a hollow is scratched in peat earth. The eggs are laid in May, and are about 2·6 by 1·8 in. They resemble those of the Herring-Gull, and vary in colour from greyish-green to olive-brown, blotched and spotted with brown and grey.

The Greater Black-backed Gull's nest is a big untidy mass of grass and seaweed, often placed on a rocky islet or crag, sometimes on the open moor, or on an islet in a loch. The eggs, laid in May, are about 3 by 2 in., stone-colour or buff, spotted with light and dark brown.

The Common Guillemot lays its egg on ledges on the bare rock of wild and rugged cliffs, or on the flat tops of "stacks." The eggs vary in colour and markings more than those of any other British bird. They measure about 3·2 by 2 in., and may be green, buff or white, plain or blotched, and streaked with brown.

The Razorbill breeds with the Guillemot in large colonies on the seacliffs, and the egg is laid on a shelf or in a crevice of the bare rock some time in May. Eggs measure 2·8 by 1·8 in., and are light buff colour, marbled and spotted with brown.

The Puffin nests where possible in a burrow, or failing this in a cleft in the rock, which is occasionally lined with a little grass or a few rootlets. The eggs, laid in May, are about 2·4 by 1·6 in., buff or grey colour, spotted and marked with grey and brown.

Arrangements for the collecting of eggs are made by the Agricultural Executive Committee of the county. Any person desirous of information as to collecting should apply to the Secretary of the Committee. If his address is not known a letter may be addressed to him at the Offices of the County Council.

Boxes are provided for transport of the eggs.

In certain counties Orders under the Wild Birds Protection Acts prohibiting the taking of the eggs of these birds have been suspended until the 1st June, 1918, in respect of eggs of gulls above-mentioned, and until the 21st June, 1918, in respect of the eggs of the Common Guillemot, Razorbill, and Puffin. In other counties the same dates should be observed.

NOTE.—*This article is also issued as Food Production Leaflet No. 30.*

The following notes have been issued in leaflet form by the Flax Production Branch of the Board:—

Notes on the Cultivation of Flax.

An appeal is being made to farmers in certain districts to devote a portion of their land to the growth of flax during the coming season. The crop is not a new one in this country, and was extensively grown up to some 30 years ago in many parts of England and Scotland both for its fibre and for its seed (which is generally known as linseed). It is usually grown for either one or the other of these purposes alone since different varieties of the plant are especially useful for each product. The present proposal, however, is to grow the crop for its fibre, which is urgently required for aeroplanes and other military necessaries, and at the same time to save the seed, not for feeding, but for the still more urgent purpose of providing seed for next year.

Soil.—The crop does well on any good medium land, the important point being cleanliness. It is not suited to light or sandy soils owing to its inability to stand drought and the difficulty of obtaining a sufficiently fine seed-bed renders it unsuitable also for the heavy clays. A wide range of soils, however, between these two extremes should be available.

Rotation.—Flax usually follows a white straw crop, but if necessary can be taken after roots or potatoes if these have not been too heavily manured. It is admirably suited for growing on newly-ploughed pasture, provided that the turf is well rotted and consolidated, since it is especially free from danger of attack by wireworm.

Manuring.—A dressing of 1 cwt. of sulphate of ammonia applied at time of sowing can be confidently recommended on all but the richest land. Its application has been found in almost all cases to yield a profit to the grower. No other manures are necessary, nor is direct dunging advisable owing to the danger of the crop being laid.

Preparation of the Land.—The land should be ploughed as early as possible, and worked down just before sowing into a fine tilth.

Sowing.—The amount of seed to be used is from 2 to 2½ bush. per acre. It may be sown broadcast (by hand, by the fiddle, or by the seed-barrow) or it may be drilled. A light corn drill with the coulters set as close together as possible is a convenient method. If, however, the rows cannot be drilled within 3 in. of one another, broadcasting by one or other of the above-mentioned methods is the better plan.

A few special drills and large number of fiddles and seed-barrows will be available at all the centres and will be lent free.

Sowing extends from early in March to the end of April in the southern counties. In Yorkshire and more northerly districts the season is rather late, namely, mid-April to early May.

The seed should be buried to a depth of ½ to 1 in., and after harrowing the land should be rolled.

Weeding.—It is necessary to go over the land once and sometimes twice to get rid of weeds of large growth such as thistles, docks and charlock. Thistles should be especially attended to since, if left, they cause great trouble and discomfort to those handling the straw during the later process of scutching.

This weeding should be done in the early stages of the growth when the plant is 2 to 2½ in. high.

Maturity.—Flax should not be allowed to become fully ripe in the field. The time to harvest it is when the lower part of the stem, to about one-third of its height has changed colour from green to yellow, and the leaves to this extent have withered and fallen. At this stage, an examination of the seeds within the capsules shows them to be just changing from a full green colour to a brownish tint.

Harvesting.—The crop must be pulled by hand, keeping the stems parallel with one another, and the handfuls tied into small sheaves. These are stacked, carted and ricked in the ordinary way.

Notes on Feeding Stuffs in March: *From the Animal Nutrition Institute, Cambridge University.*

THERE is no improvement since last month in the supplies of concentrated feeding stuffs, but it is hoped that the arrangements made by the Ministry of Food for ensuring their equitable distribution will tend to enable farmers to maintain their live stock.

The attention of all farmers is drawn to the statement at the beginning of this number of the *Journal*, in which the Board of Agriculture and the Ministry of Food set out their joint policy with regard to the feeding of live stock. The shortage of concentrated feeding stuffs is so acute that unless farmers loyally support this policy it will be impossible to maintain indispensable animals, such as working horses and milking cows, until after next harvest.

It is to be hoped that the Ministry of Food will shortly extend to other classes of live stock the priority system which they have already announced for milking cows.

Horses.—The maximum quantity of all concentrated foods which a farmer may use for his horses from the present date to the end of April is 7 cwt., which works out at about 10 lb. per head per day. Farmers should note that this is the maximum allowance for any horse, and they should, if possible, economise on this amount by giving their light horses and cobs a smaller ration. Unless they do so, the stock of oats in the country will not last until this year's crop is harvested.

There will be great difficulty in feeding the horses responsible for transport work in towns and the ponies employed in the coal industry. Every farmer should reckon up the minimum quantity of oats on which he can maintain his horses until this year's crop is threshed so that he may know what quantity of oats he can spare.

It is highly desirable that arrangements should be made for purchasing all spare oats so that they may be available for transport horses and pit ponies, which are just as indispensable for the work of the nation as are the horses employed on farms.

Milking Cows.—Every cow-keeper who requires concentrated food to maintain his milk supply should communicate with the Livestock Commissioner for his district, stating the number of cows which are actually in milk, the quantity of feeding stuffs, if any, which he has in stock and the quantity he requires during the coming four weeks. On receiving these particulars the Area Livestock Commissioner will grant a Priority Certificate to the cow-keeper, which will entitle him to buy the feeding stuffs he requires for his cows from a local dealer, who must supply his needs before selling any feeding stuffs for any other class of animal.

Cow-keepers are reminded that great economy in concentrated food results from rationing each cow according to her yield of milk.

Cattle Fattening for Beef Production.—Farmers who have cattle fattening at the present time should note carefully the statement by the Ministry of Food and the Board of Agriculture printed at the beginning of this number of the *Journal.* The statement there made that no concentrated food can be spared for fattening cattle, sheep or pigs is based on the most careful estimates of the quantity of feeding stuffs in the country. Its real meaning is that if cake or meal is used for fattening these animals, the horses and milking cows must go short. The situation is extremely serious, and the best way out of it is to sell for slaughter any animals which are so forward that they would lose flesh if their cake was stopped, and to carry on the less forward animals on roots and straw, with a little hay, if it can be spared.

Sheep.—Fattening sheep should be dealt with in the same way as fattening cattle; that is to say, any sheep which are so forward that they would lose weight if their concentrated food is withdrawn, should be sold at once for slaughter, and the rest carried on with roots and chaff only.

As announced in the statement earlier in this number, it is hoped that arrangements will be made to allow 14 lb. of concentrated food for breeding ewes. This allowance is intended to help the ewes if the weather is hard about lambing time. It may also be possible to obtain a small allowance for ram lambs. No concentrated food is available for other lambs or for fattening sheep.

Pigs.—The same principles apply in the case of pigs. It may be possible to allow 4 cwt. of meal for each breeding sow to carry her through the suckling period and 1 cwt. for each young pig at weaning time. Beyond this no concentrated food can be spared for fattening pigs. The attention of readers is directed to recent articles in this *Journal* on the feeding of pigs on roots, grass, green stuff, and household and garden refuse.

Notes on Manures in March:
From the Rothamsted Experimental Station, Harpenden, Herts.

Sulphate of Ammonia is not usually wanted on Newly-Broken Grass Land.—As a general rule sulphate of ammonia is less needed for corn on newly-broken grass land than on old arable land, and at present it hould not be used on the former if any shortage is anticipated. Newly-broken grass land is commonly so rich in fertility that it can go along for a longer time without help than the old arable land. If supplies of sulphate of ammonia were unlimited it would be a different case, and a small dressing might well be applied in the hope of getting an increase in crop, but in view of the possibility of a shortage it is desirable to use the supplies as economically as can be. Exceptions arise where the turf is thin and where, therefore, no great bulk has been added to the stores of organic matter in the soil. Such cases occur on some of the Boulder clays, Millstone grits, soils derived from granite, and very light soils: on these it may be necessary to use the sulphate of ammonia, though even here a dressing of lime might prove an efficient liberator of fertility.

Farmers who are unable to obtain full supplies of sulphate of ammonia should use what they have got for potatoes and corn on old arable land. If swedes usually give less than 14 or 15 tons per acre they need only receive a small dressing of sulphate of ammonia—they can get along with phosphates only.

Ash Pit and other Residues.—In view of the shortage of nitrogenous fertilisers inquiries are being made by a number of correspondents as to the possibility of utilising ash-pit residues and similar waste products as fertilisers. From samples and analyses that have been submitted it appears that these residues can without great difficulty be worked up to contain about ½ per cent. of nitrogen and of potash and about 1 per cent. of phosphate. It must be admitted that the material is not of great value in spite of the noxious smell some samples possess; no fertiliser, however, ought to be judged by its smell. On the other hand it is cheap and can be obtained in large quantities. On heavy land it has advantages over and above its fertiliser content, for it seems to lighten and make the soil more workable. If it can be obtained at anything like 5*s*. per ton it is probably worth getting. Allotment holders on heavy land might find it distinctly useful.

Slaughter-house Residues.—In large cities some provision (though not always very much) is made for the collection and utilisation as manure of slaughter-house residues; but in smaller places the provision is very slight, and in many cases non-existent. An ordinary small township of 10,000 inhabitants, where say 600 bullocks and 1,200 sheep are slaughtered each year, should produce something like 20 tons of blood per annum and about 10 tons of other wastes of manurial value, which, if dried down and well ground, would work up into 2 tons of high-grade dried blood, 1 ton of high-grade meat meal and 5 tons of lower grade. These quantities are not great in themselves, but in the aggregate they are considerable. In any case farmers or allotment holders able to secure such wastes should do so and add them to the manure heap. A number of other wastes are obtainable and might be utilised.

Sewage Sludge.—Although sewage sludges are usually of no great fertilising value they often are of some use, and when they can be obtained for nothing or at a nominal rate they may be distinctly worth collecting by allotment holders and farmers. It is a great mistake to attach any exaggerated value to them, but it is an equal mistake to ignore them altogether. Some sludges contain a good deal of lime; others a fair proportion of organic matter, although there is nearly always a large amount of water. The weakness of most of them is that the nitrogen is not easily available. Before making much use of them it is well to have analyses made.

Bonfire Ashes.—Now that hedging and threshing are going on a certain amount of waste vegetable material is being burnt, and it is well to remember that the ash of this material is fairly rich in potash, of which it contains as a rule about as much as kainit. The quantity available is not great but it is valuable to light land farmers, some of whom will soon begin to suffer from lack of potash. In such cases a little potash goes a long way.

Catch Cropping and Green Manuring.—The solution of the manure shortage is to go in for as much green manuring and catch cropping as possible. Catch cropping provides extra keep for animals and this means extra manure. Clover, sainfoin, vetches and lucerne not only increase the bulk of the manure of animals to which they are fed, but they also enrich it, and their residues when ploughed into the soil add greatly to the stores of soil fertility. In districts where the second cut of clover is apt to be poor, and where for any reason clover seed is not readily produced, it is well to consider the advisability of ploughing up the ley directly after the first cut, and giving a bastard fallow in preparation for the succeeding corn crop. This is practised with considerable success on certain farms in Hertfordshire.

Manuring for Potatoes.—Some interesting results are reported from East Suffolk showing what great possibilities there are in the way of potato growing. This county is not usually deemed suitable for potatoes, though there is no climatic or soil reason why it should not be. In a trial made at Horne, and reported by Mr. A. W. Oldershaw, the plot receiving farmyard manure only gave a yield of 11 tons per acre, while one receiving dung and artificials (2 cwt. sulphate of ammonia and 4 cwt. bone superphosphate per acre) gave the extraordinary crop of 16 tons 6 cwt. per acre—one of the heaviest recorded in field trials. A third plot received in addition 4 cwt. of salt, but in this case the yield was depressed, being 14 tons 14 cwt. in place of 16 tons 6 cwt.; further, the tops showed that the salt had caused injury. The Cockle Park experiments have indicated that in the North of England a suitable dressing for potatoes is 12 tons of dung, 3 to 4 cwt. high-grade basic slag and 1½ cwt. sulphate of ammonia per acre; the dung is spread in the split drills before planting, and the slag and sulphate of ammonia carefully distributed on the top of the dung before closing the drills.

Spring Dressing for Corn Crops.—The winter in most places has been favourable to the corn and the winter-sown crops are usually looking well. In these circumstances spring dressings will probably not be needed by corn taken after roots that received dung, or after clover leys where a good stand of clover was secured. Some help may be necessary, however, for crops taken after a previous straw crop. A suitable dressing in this case would be ¾ to 1¼ cwt. sulphate of ammonia per acre, or, if it can be obtained, 20 to 30 bush. of soot.

Spring-sown corn should in addition receive some superphosphate, say 2 or 3 cwt. per acre, harrowed in with the seed; this helps the plant to make an early start, valuable in case of spring drought, and it also hastens maturity—equally valuable in a wet autumn.

Where sulphate of ammonia is being used against frit-fly it should be remembered that only dressings applied with the seed are likely to prove useful, the top dressings given later not being particularly effective against this pest.

Production of Crops in the United Kingdom in 1917, with Exports of Agricultural Produce and Miscellaneous Agricultural Imports.*

IT is proposed in this article to give in a series of tables some general statistics respecting the home produce, exports and imports of certain agricultural commodities, with the corresponding figure for 1913 (the year before the War), for the purpose of making comparisons as to the increases or decreases which have resulted owing to the conditions of the War. It is not possible at the present time to give statistics of the principal articles of agricultural produce imported into this country during 1917, as the publication of this information in the Board of Trade Returns has been for the time suspended. The figures regarding agricultural exports and imports of agricultural produce other than food during 1917 are, however, available, and are given below.

Crops of the United Kingdom.—A comparison of the yield of the more important crops in the United Kingdom in 1917 with the yields in 1916 and 1913 may first be made. The figures for 1917 are still subject to revision.

	1917.	1916.	1913.
	qr.	qr.	qr
Wheat	8,040,000	7,471,884	7,087,050
Barley	7,189,000	6,612,550	8,204,066
Oats	26,023,000	21,333,782	20,660,279
Beans	474,000	892,572	950,309
	tons	tons	tons
Potatoes	8,603,000	5,468,881	7,604,804
Turnips and Swedes	24,841,000	23,318,170	25,313,818
Mangolds	10,369,000	9,009,752	9,276,129
Hay	13,158,000	15,197,872	15,395,088
	acres	acres.	acres
Grass not for hay	22,961,334	24,305,071	24,055,440

The effect which the War has had on the prices of the three cereal crops—wheat, barley and oats—is shown in the following table :—

Crop.	Average Price per Quarter.					Percentage Increase since 1913
	1913.	1914.	1915.	1916.	1917.	
	s. d	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*Per cent.*
Wheat ..	31 8	34 11	52 10	58 5	75 9	139
Barley ..	27 3	27 2	37 4	53 6	64 9	138
Oats ..	19 1	20 11	30 2	33 5	49 10	161

Imports of Feeding Stuffs.—The imports of oil seed cake and of oil seeds, from which feeding stuffs are produced as by-products, are shown in the following table. A comparison of the quantities in the two years 1913 and 1917 gives an index of the relative amounts of feeding stuffs available from imported oil-seeds and cakes :—

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* The accounts of goods imported include all articles of food, but do not include other goods which, at the time of importation, were the property of His Majesty's Government or the Governments of the Allies. The accounts of goods exported include goods bought in the United Kingdom by, or on behalf of, the Governments of the Allies, but do not include goods taken from British Government stores and depots, or goods bought by His Majesty's Government and shipped on Government vessels.

Description.	Quantity.		Value.	
	1917.	1913	1917.	1913.
			£	£
Cotton seed .. tons	219,045	615,332	4,002,107	4,648,617
Flax seed or linseed qr.	1,016,011	3,274,062	5,508,491	7,195,399
Rape seed .. ,,	305,505	265,560	1,480,745	531,725
Soya beans .. tons	25,049	76,452	500,176	635,747
Nuts and kernels (for expressing oil) tons	447,592	81,120	12,621,210	1,933,052
Oil seed cake .. ,,	212,892	406,700	3,638,144	2,539,892

Thus, the supplies of oil seed cake, soya beans, linseed and cotton seed have decreased considerably since 1913, a fact which will account for the comparatively high prices of feeding cakes from the seeds. Increases are, however, shown by rape seed, and nuts and kernels, especially in the latter case.

Manures.—The imports and exports of manures in 1917 are compared with those of 1913 in the two following tables :—

IMPORTS OF MANURES FOR HOME CONSUMPTION.

Kind.	Quantity.		Value.	
	1917	1913	1917.	1913.
	tons.	tons	£	£
Basic slag	—	51,133	—	102,114
Bones, burnt and unburnt	3,870	40,685	41,623	219,637
Guano	2,601	25,548	27,675	149,189
Nitrate of soda ..	1,680	140,926	36,490	1,490,669
Phosphate of lime and rock phosphate ..	276,617	539,016	1,172,557	874,166

EXPORTS OF MANURES MANUFACTURED IN THE UNITED KINGDOM.

Kind.	Quantity.		Value.	
	1917.	1913.	1917.	1913.
	tons.	tons.	£	£
Sulphate of ammonia	62,960	323,054	1,188,825	4,390,547
Superphosphates ..	3,232	63,480	20,639	166,314
Basic slag	1,825	165,100	6,561	261,972
Others	27,386	152,437	285,947	926,656
Total	95,403	704,071	1,501,972	5,745,489

The main features to be noticed are the stoppage of basic slag imports and the much smaller quantities of nitrate of soda and phosphates imported. Though we continue to export sulphate of ammonia the figure for 1917 shows a considerable drop on the 1916 figure of 259,290 tons. The production of sulphate of ammonia in the United Kingdom in 1914 was 432,618 tons (no later figures are available), so that a very considerable proportion of our home manufacture is normally exported. It is worth noticing that the nitrate of soda imports cost £10 11*s*. per ton in 1913, and £21 14*s*. in 1917, an increase of 106 per cent. on the 1913 figure.

Exports of Animals.—The chief items in the export trade from the agriculturist's point of view are those relating to live stock. These are compared with pre-war figures in the next table :—

EXPORT OF LIVE ANIMALS (for Breeding).

Description	Number.		Value.	
	1917.	1913	1917.	1913.
			£	£
Cattle	3,022	4,544	317,226	274,297
Sheep and lambs ..	3,850	6,799	74,503	96,043
Swine	154	1,093	1,427	14,469
Horses	1,287	68,632	357,654	1,782,315
Animals of other kinds (not for food) ..	20,565	41,251	39,962	62,744

The export of live animals has shown a large decrease during the past year. A rise in the value per head over the 1916 figure has occurred however, except in the case of swine, which fell from £10 to £9 5*s*. The increases are :—cattle from £72 to £105, sheep and lambs from £19 to £19 7*s*., and horses from £254 to £278.

Miscellaneous Imports and Exports.—The two concluding tables give particulars as to some miscellaneous agricultural imports and exports.

MISCELLANEOUS IMPORTS.

Description.	Quantity.		Value.	
	1917.	1913.	1917.	1913.
	cwt.	cwt.	£	£
Wood and timber ..	—	—	25,647,231	33,788,884
Tallow and stearine	650,472	1,984,673	1,981,259	3,375,072
Hides :				
Dry	711,894	622,889	5,173,852	2,688,467
Wet	911,339	831,323	6,583,978	3,159,832
Seeds, clover and grass	204,354	260,751	727,908	623,769
Flowers, fresh ..	—	—	159,771	288,728
	No.	No.		
Horses	21,870	11,899	1,380,039	460,702

MISCELLANEOUS EXPORTS.

Description.		1917.	1913.
Grain and flour	£	875,041	3,561,831
Meat (including animals for food) ..	£	268,754	1,238,907
Wool (sheep's or lamb's)	lb.	8,781,200	28,662,100
	£	988,342	1,807,645
Hides and undressed skins	£	1,319,072	1,886,305
Oil-seed cake	tons	85	53,448
	£	1,541	354,344
Agricultural Machinery (prime movers except electrical)	£	63,498	1,360,954
Agricultural Machinery (not prime movers or electrical)	£	84,717	1,628,232

Report of the Forestry Sub-Committee of the Reconstruction Committee.

THE Sub-Committee of the Reconstruction Committee appointed by the Prime Minister in July, 1916, "to consider and report upon the best means of conserving and developing the woodland and forestry resources of the United Kingdom, having regard to the experience gained during the War," have just issued their Final Report (Cd. 8881), 1918. The Committee was constituted as follows:—

The Right Hon. F. D. ACLAND, M.P. (*Chairman*).
Mr. L. C. BROMLEY, Treasury.
The Right Hon. LORD RICHARD F. CAVENDISH, Development Commission.
Major the VISCOUNT DE VESCI.
Lieutenant-Colonel F. D. W. DRUMMOND.
Sir JOHN HARMOOD-BANNER, M.P.
Major-General the LORD LOVAT, K.C.V.O., C.B., D.S.O.
Mr. T. H. MIDDLETON, C.B., Board of Agriculture and Fisheries.
Professor Sir WILLIAM SCHLICH, K.C.I.E., F.R.S.
Sir JOHN STIRLING-MAXWELL, Bart.
Mr. JOHN SUTHERLAND, Board of Agriculture for Scotland.
Mr. S. WALSH, M.P.
Mr. W. TYSON WILSON, M.P.

Secretary, Mr. R. L. ROBINSON, His Majesty's Office of Woods, etc.

Mr. A. C. FORBES, Department of Agriculture and Technical Instruction for Ireland, was added to the Committee in September, 1916.

Thirty-one sittings were held, and on account of the large quantities of authoritative material available it was not found necessary to examine witnesses. Certain memoranda were, however, submitted by representatives of interested societies, etc., at the Committee's request, and these are published in the appendices to the Final Report.

The Final Report is divided into two parts: (1) The Present Position, and (2) Forest Policy recommended. Under (1) the position of forestry in the United Kingdom is discussed, and the national requirements of timber and the prospects of supply stated. In the light of the events of the War the Committee hold that the forest policy of the State has been totally inadequate and that from the standpoint of national safety, as well as from the social and economic benefits which would accrue, an adequate forest policy should be adopted without delay. They then, under heading (2), state their conclusions and recommendations, which are summarised as follows:—

(1) The total area under woodland in the United Kingdom before the War was estimated at 3,000,000 acres, the annual yield from which is believed to have been 45,000,000 cubic ft., or about one-third of what it should have been under correct silvicultural management. These figures indicate the unsatisfactory condition of British and Irish woods as at present managed, and prove the urgency of remedial measures in the interests of national economy.

(2) During the five years preceding the War the average annual imports of timber similar in character to that produced in the British Isles were equivalent to 550,000,000 cubic ft. of standing timber. The home production was therefore less than 8 per cent. of the consumption. The imports of timbers of all kinds during the years 1915 and 1916 were respectively three-quarters and two-thirds of the normal pre-war imports, and their cost for the two years was £74,000,000, or £37,000,000 in excess of their pre-war value. These imports absorbed 7,000,000 net tons of shipping, equivalent to approximately 14,000,000 tons dead weight.

(3) The area of land utilised for rough grazing, but capable of growing first-class coniferous timber of the same character as that imported, is not less than 3,000,000 and probably more than 5,000,000 acres. Two million acres could be devoted to timber production without decreasing the home production of meat by more than 0·7 per cent., and if so used would ultimately afford employment to at least ten times the number of men now engaged on that area.

(4) Dependence on imported timber has proved a serious handicap in the conduct of the War. The United Kingdom cannot run the risk of future wars without safeguarding its supplies of timber as every other Power that counts has already done

(5) In order to render the United Kingdom independent of imported timber for three years, in an emergency, it is necessary, while making due allowance for an improved yield from existing woods, to afforest 1,770,000 acres. Taking 80 years as the average rotation, we advise that two-thirds of the whole should be planted in the first 40 years. We consider that the quota to be planted in the first 10 years should, in view of the initial difficulties, be limited to 200,000 acres, of which we advise 150,000 acres should be planted by the State and 50,000 acres by public bodies and private individuals, assisted by grants, or by co-operation between them and the State. The area to be planted by the State in subsequent years may be reduced in the same degree as private individuals come forward to undertake the work.

(6) It is not proposed to plant arable land, but a limited area of arable land should be acquired with the forest sites, wherever possible, in order to provide small holdings for forest workers. Our proposals carry with them the important contingent advantage that they will cause large areas of the United Kingdom, now almost waste, to be put to their best economic use. They will also, if provision is made in time, afford the means for settling discharged soldiers on the land under healthy conditions.

(7) Forestry demands long views, but the first fruits are not so long delayed as many imagine. The policy of State afforestation which we recommend will begin to provide pitwood, from the quicker-growing species on the better kinds of mountain land, from the fifteenth year onwards; by the fortieth year the plantations made in the first ten years alone will contain sufficient timber to keep our pits supplied, in emergency, for two years on the scale of present consumption.

(8) The first essential is a Forest Authority equipped with funds and powers to survey, purchase, lease and plant land and generally to administer the areas acquired, with compulsory powers to be exercised, when needed, after due inquiry and the award of fair compensation. The care of forestry, now divided among several departments, should be centralised in this body.

(9) We recommend that the Authority should be authorised to make limited grants for every acre replanted or newly afforested during the first 10 years after the War by public bodies or private individuals; such plantations to be made in accordance with approved plans and conditions.

(10) We estimate the cost for the first 10 years at £3,425,000. It may be necessary to invest £15,000,000 altogether in this

enterprise during the first 40 years. After that time the scheme should be self-supporting. The financial return depends on prices, wages, bank rates, etc., which are difficult to forecast. Forests are a national necessity; the country must have them even though they yield less than the current rate of interest on the capital invested. The whole sum involved is less than half the direct loss incurred during the years 1915 and 1916 through dependence on imported timber.

(11) The above proposals are framed in the interest of national safety, which requires that more timber should be grown in the British Isles. There remains a further question. The United Kingdom derives more than half its imported timber from virgin forests in foreign countries, which are steadily being depleted. Canada contains the only large reserves within the Empire. Unless arrangements can be made with the Dominion Government for the effectual conservation of these reserves, it is inevitable that provision should be made within the British Isles on a far larger scale than is here proposed for purposes of defence. We consider that this question should be taken up at once with the Dominion Government.

The Nitrogen Products Committee.

THE Ministry of Munitions has just issued an interesting 14-page pamphlet (obtainable from His Majesty's Stationery Office, Imperial House, Kingsway, London, W.C. 2, price *2d.*, excluding postage) on the Nitrogen Problem and the Work of the Nitrogen Products Committee. The question of nitrogen supplies, especially in regard to munitions and agriculture, had become so urgent and important as a result of the War that the Minister of Munitions, on 10th October, 1916, appointed a Committee, under the chairmanship of Colonel H. E. F. Goold-Adams, C.B., C.M.G., R.A., to consider the whole problem.

The following were the terms of reference :—

"1. To consider the relative advantages for this country and for the Empire of the various methods for the fixation of atmospheric nitrogen from the point of view both of war and peace purposes; to ascertain their relative costs, and to advise on proposals relevant thereto which may be submitted to the Department.

2. To examine into the supply of the raw materials required, *e.g.*, pure nitrogen and hydrogen, and into the utilisation of the by-products obtained.

3. Since some of the processes employed depend for their success on the provision of large supplies of cheap power, to ascertain where and how this can best be obtained.

4. To consider what steps can with advantage be taken to conserve and increase the national resources in nitrogen-bearing compounds and to limit their wastage."

The Board of Agriculture and Fisheries, the Board of Trade, the Explosives Department of the Ministry of Munitions, and a number of scientific societies were represented on the Committee, and a part of the new Ramsay Laboratory was placed at its disposal for the purpose of its research work. The Committee also received much outside expert assistance.

The Committee were unable immediately to present a complete Report, but an Interim Report, embodying certain definite conclusions, was submitted to the Minister of Munitions in February, 1917. The following is the substance of these recommendations :—

(*a*) *By-product Ammonia.*—The importance of increasing the output of by-product ammonia for munitions and for agriculture was pointed out. Steps were indicated whereby an increase could be obtained from existing gasworks and coke-oven plants. It was also recommended that action should be taken to avoid the loss of ammonia known to be occurring in certain districts.

(*b*) *Ammonia Oxidation Process.*—The erection at the earliest possible moment of plant capable of producing in the aggregate at least 10,000 tons of nitric acid per annum from gasworks or coke-oven ammonia was recommended.

(*c*) *Cyanamide Process.*—The erection of a factory having an annual output of the order of 50,000 tons of cyanamide was recommended, the cyanamide to be utilised as such for agriculture or for the production of ammonia.

(*d*) *Synthetic Ammonia Process.*—The erection of a full-sized trial unit plant for the synthetic ammonia process was recommended.

As a result of these recommendations the Minister of Munitions made the following decisions, and appointed a small Executive Committee to supervise the action involved in giving effect to them :—

(*a*) *By-product Ammonia.*—The Committee was requested to deal with the problem of conserving ammonia and of augmenting the output on the lines of the recommendations.

(*b*) *Ammonia Oxidation Process.*—The Ministry of Munitions would undertake the installation of one Government plant on the lines suggested, or, if the Committee so advised, the Ministry would agree to the erection of plants by suitable private firms. The information resulting from the research work was to be placed freely at the disposal of *bonâ fide* manufacturers, but was not to become the exclusive property of any firm or group of firms.

(*c*) *Cyanamide Process.*—The Committee was requested to investigate the relative merits of a Government scheme and of other schemes that had been put forward involving private enterprise, and to submit a Report embodying definite proposals.

(*d*) *Synthetic Ammonia Process.*—The erection of the full-sized trial unit was authorised.

The various Sub-Committees set up by the Main Committee have already completed, or are now engaged upon, their final Reports. There will then remain the Final Report of the Main Committee, and endeavours are being made for this document to be issued at the earliest possible date.

The pamphlet now issued commences with a general outline of the nitrogen problem, and then proceeds to deal with the work of the Committee at the various stages of its career. The different researches on which it has been engaged, especially in regard to Nitrogen Fixation, are discussed, as are also the importance of cheap electric power and nitrogen in the manufacture of sulphuric acid. The Committee fully recognise the place of nitrogen as a fertiliser, and the following passage from the pamphlet will be of interest to agriculturists :—

" Nitrogen is also an essential constituent of all vegetation, and the world's production of food is becoming more and more dependent upon the utilisation of nitrogenous fertilisers. The world's consumption of such materials appears practically to double every ten years, and in 1913 had attained the large figure of 2,500,000 tons of Chile nitrate and about 1,400,000 tons of ammonium sulphate.

With the outbreak of war, the demand for explosives became of paramount importance, and the requirements of agriculture for the time being took a secondary position. The prospect of a world shortage of food, however, has served to bring the agricultural aspect of the problem again into the forefront. In this connection it is worthy of note that in 1898 Sir William Crookes, in a carefully reasoned statement, called attention to the possibility of a shortage in the wheat supply of the world and to the vital bearing upon this question of an adequate supply of nitrogenous fertilisers."

The Committee, in their preliminary remarks on the nitrogen situation, also state that, in spite of the fact that the incentive to the commercial establishment of nitrogen fixation may be said to have originated in this country, no steps were taken in the United Kingdom to obtain nitrogen compounds other than cyanides synthetically. The ammonia recovered at gasworks and coke-ovens has constituted practically the only form of combined nitrogen produced in this country. During the War the command of the seas has hitherto enabled Great Britain to rely entirely upon importation for the whole of our supplies of nitrate of soda, the most important raw material of our explosives industry. The Central Powers, on the contrary, having been cut off from external supplies, were compelled to fall back upon their internal resources, with the result that nitrogen fixation processes, some of which were established commercially before the War, have been developed upon an enormous scale.

In the opinion of the Committee the success which has attended the systematic research work that has been undertaken foreshadows the possibility of developments of permanent character to the country.

Allotments in 1918.

LAST year the allotment holders of the country did a tremendous service to the cause of food production. It has been estimated that over 1,000,000 tons of vegetables were produced on the allotments of England and Wales and consumed within easy reach of the land on which they were produced by the growers and their families. As a consequence not only were the transit facilities of the country notably relieved of the carriage of produce which otherwise would, in many cases, have had to be drawn over considerable distances, but thousands of working-class families were supplied more generously than ever before with fresh vegetables and were benefited accordingly. No bare figures can effectively represent the service to the national food supply and well-being thus rendered by the allotment-holders in 1917.

About 200,000 of their allotments, it may be pointed out, were entirely new creations under the Cultivation of Lands Orders administered by the Food Production Department of the Board of Agriculture, and probably at least as many more have been established by voluntary agreement during the last two years. It is estimated that the total number of allotments in England and Wales at present is not far short of 1,000,000.

The Food Production Department is desirous of increasing this number by at least 50 per cent. by the end of March; this would bring the total to something like 1,500,000 allotment-holders in the country. The Rural League, the Vacant Lands Cultivation Society, the Federation of Allotment Holders, the Agricultural Organisation Society, the Royal Horticultural Society, and other organisations, are actively co-operating in the effort to secure this increase of allotments during the spring.

By common consent food supplies will be very short throughout the world this year, and it is quite possible that the efforts of our allotment holders may make all the difference between a reasonably plentiful supply of fresh vegetable food and an extreme scarcity. It therefore behoves every allotment-holder to redouble his efforts in economical food production, and every non-allotment holder in a position to become one to take up at least a few square yards of ground and do his best in the general movement.

Tradesmen's Associations, Friendly Societies, Trade Unions, Working Men's Clubs, and sporting organisations of various kinds, can give material assistance by organising their members for this purpose. Individuals unable to obtain land should apply to the local authority, and, if possible, get other persons similarly situated to do the same. If they fail to obtain land promptly they should apply to the Food Production Department, which will at once inquire into local needs and local resources.

Firms having land attached to their works not yet cultivated can do sound service to the nation by placing these at the disposal of their employés for allotment purposes. Last year the railway companies created many thousands of new allotments in this way, and a large number of manufacturers followed suit. This spring Messrs. Ransome and Marks, of Newark-on-Trent, have laid out 8 acres of land in 112 plots for the use of their workpeople.

The expansion of the allotment movement in the past two years has been marvellous; and it looks possible in some places, at least before the present year is ended, that every householder will be an allotment-holder. It would be interesting to know what town or village boasts the largest percentage of allotment-holders to population. It has been stated that one in twenty of the population of Luton (Beds) is an allotment-holder. This is a high percentage, but at Tenby, out of 900 householders, 450 are now said to have allotments.

More Allotments.—The number of new allotments created under the Cultivation of Lands Order which has now been reported to the Food Production Department, exceeds 200,000. As an example of the enormous expansion of the allotment movement recently the position in the borough of Luton (Beds) is interesting. Before the War there were in this town of 50,000 inhabitants about 1,000 allotment-holders. To-day, there are 2,500. The 1,000 pre-war allotment men had 126 acres of permanent allotments. Since the outbreak of War 553 plots, covering 37 acres, have been provided for temporary cultivation, and 952 plots, containing 93 acres, for permanent allotments. The County Borough of Sunderland is acquiring 40 acres for laying out as 560 allotments. At Southwick-on-Wear, 7 acres are being divided into 100 plots. Twenty-five acres at Coventry have just been cut up to make 350 allotments. Portsmouth has just added 1,000 more to its allotment roll; Newcastle-on-Tyne, 420; Ashington (a mining village), 364; and Port of Blythe (Northumberland), 260. Other plots recently laid out on the advice of the Food Production Department are as follows: Hammersmith, 140 of 10 rods each; Maidenhead, 120 plots totalling 8 acres; Wigton, 5 acres; Carlisle, 6 acres (90 allotments) and Kingston-on-Thames, 12 acres (168 plots).

Satisfactory progress is reported by the Department's Inspectors entrusted with the negotiation of new allotments in districts where a hitherto unsatisfied demand has existed. Twenty-eight centres were visited last week with the result that the local authorities concerned are acquiring 626 acres of ground and providing 9,106 new allotments. The Leeds authorities are laying out 5,000 allotments of about 1/15th of an acre on 333 acres. Perhaps the most striking feature of the allotment expansion is the activity in this matter of the northern miner. At Consett, 16 more acres are being laid out for 224 applicants; at Blaydon-on-Tyne, 11½ acres for 161; and at Leadgate, 2½ acres. "When this area is allotted over 90 per cent. of the householders (900 in 1,060) will be provided with allotments." This is even better than the 50 per cent. of Tenby.

Uncultivated Gardens.—Reports from all quarters show that the demand for allotments continues to grow, and in many districts the local authorities find it difficult to obtain land sufficient for all applicants. The Food Production Department therefore suggests that the local councils might consider whether there are uncultivated kitchen gardens belonging to vacant dwelling-houses that could be utilised for growing vegetables. These gardens cannot be taken by the councils under the Cultivation of Lands Order, but the Board of Agriculture have power to take possession of them under the Defence of the Realm Regulations, and the Food Production Department are prepared to consider sympathetically any definite proposals made by a local authority for securing their cultivation during the present emergency where it can be arranged without risk of serious injury to the property.

New Allotments.—Most of those who secured allotments last year are now reaping the reward of their labour, and their success will no doubt stimulate less fortunate neighbours to start allotments for themselves. This is all to the good, as by the sowing of suitable crops, such as second early potatoes, which "come in" in the early summer, useful food will be ensured at a time when a supplement to the national larder will be most helpful. As regards new allotments, a timely hint comes from the Food Production Department, who point out the desirability of getting on with the digging at every available opportunity. As they say, the earlier new ground is dug the better. Time is necessary to admit of the decay of turf and fibre; to permit of sufficient aeration, and the formation of a fine seed-bed; and to enable the soil to become properly consolidated before seed time. Late-dug grass land is apt to dry out in dry weather. The plants then suffer and frequently succumb. A word of warning is necessary. Last year, it was a common practice among allotment-holders to pare and stack the turf before digging, presumably in the belief that removing the turf would also remove the wireworms. This, however, is by no means always the case, as in winter wireworms often work deep in the ground, and paring the turf not only takes away a main source of fertility from the soil, but also deprives the wireworms of a part of their food supply, thus encouraging them to attack the crops grown on the land with even greater avidity.

The Food Production Department advise, therefore, that the turf should be dug in so that the sod is inverted at the bottom of the first spit of soil. Stacking and burning the turf should only be done where it consists of a mass of couch or twitch.

Corn Growing on Allotments.—Many inquiries have recently been received by the Food Production Department as to the desirability of growing corn on allotments. The Department point out that the practice is undesirable in the national interest. It is estimated that from twice to three times as much human food is obtained from average crops of the vegetables commonly grown as from an average crop of corn grown on a similar area. Moreover, owing to the risk of loss through the ravages of birds, especially in residential districts, and the liability to damage from wind and rain, which is much greater on small than on large areas, the chances of securing even a moderate corn crop from small patches of ground are doubtful, and the use of valuable seed corn in such circumstances is deprecated. There are other obvious reasons in favour of vegetables; for example, they are less susceptible to wireworm attacks on newly-broken land; they suffer less from drought; several crops may be obtained from the same ground during the year; and vegetable-growing is, of course, specially adapted to the spade, whereas corn is most economically grown on a field scale, with the help of horses and machinery.

Artificials for Allotments.—Allotment holders who require artificial manure and have difficulty in obtaining supplies locally should communicate at once with one of the Approved Agents recognised by the County Agricultural Executive Committees and the Food Production Department for the sale of artificial fertilisers. Lists of Approved Agents for each county may be obtained on application to the County Agricultural Executive Committee or to the Food Production Department, 72, Victoria Street, London, S.W. 1.

In order to obtain the most favourable terms allotment holders should combine to place a large order. The advantage of doing so may be illustrated by the prices which have been fixed for sulphate of ammonia when purchased between January and May of this year :—

For 2 cwt. and less than 1 ton	18*s*. 0*d*. per cwt.
,, 1 ,, ,, 2 cwt.	19*s*. 0*d*. ,,
,, quantities not less than 28 lb. and less than 1 cwt.	21*s*. 0*d*. ,,

Net cash; retail price to consumers.
By dealers *ex* store or by makers *ex* works.

Prices for superphosphate and basic slag may also be obtained from the Approved Agents; whilst pamphlets on the use of artificial manures may be had free on application to the Food Production Department.

Trespass on Allotments.—A large number of allotment-holders, whose allotments are not held under the Cultivation of

Lands Order, have written to the Food Production Department asking to be supplied with a form of notice suitable for displaying on their plots. Accordingly the Department has drawn up a notice which offers the same protection to *any* allotment as that formerly provided for " war-time allotments " (under the Cultivation of Lands Order). The form of notice which is being circulated by the Department is as follows :—

> *NOTICE.*
>
> This land is used as allotments or field gardens and crops are growing thereon.
>
> Any person who, without lawful authority, enters or remains on this land, or damages any growing crops or hedge or fence thereon, is liable on conviction under the Defence of the Realm Regulations to a fine of £100 or imprisonment.

Posters containing the foregoing notice suitable for displaying on allotments are being supplied free by " Allotments and Gardens," Chandos Chambers, Buckingham Street, Strand, W.C. 2. and " The Smallholder," Henrietta Street, Strand. W.C. 2.

Allotments in Wales.—The allotment movement is expanding almost as rapidly in Wales as in England. In most districts landowners are taking a very friendly line towards the movement, but here and there compulsion has had to be exercised for the purpose of obtaining land. The Llandudno Urban Council has just acquired compulsorily a new field for allotments. At the beginning of the War the total area of the allotment plots in Llandudno was $7\frac{1}{16}$ acres. By the end of last year 300 war allotments had been created by the Urban Council, besides 34 other plots on railway sidings cultivated by railway men. The new field will provide about 50 additional allotments. Moreover, at the neighbouring village of Penryhn-side, another field of 5 acres has been taken over by compulsion and will be cultivated as allotments by tenants of the Parish Council. Applications for 51 additional plots have just been received by the Bangor Allotment Association, and steps are being taken by the Bangor City Council and the Carnarvonshire Executive Committee to satisfy the demand.

Allotments near Towns.—The Agricultural Executive Committee for the North Riding of Yorkshire and the York Corporation are co-operating in the supply of more allotments in the York district. The Corporation, having informed the Committee that it required $5\frac{3}{4}$ acres of land outside the city boundary with a view to laying out allotments, the Committee promptly agreed to the land being taken and gave instructions for the necessary action.

THE following article by Mr. A. D. Cotton has been drawn up for the Board for issue as a new edition of Leaflet No. 56:—

Apple Canker (*Nectria ditissima*).

Apple Canker is one of the most destructive diseases with which fruit growers have to contend. It is a serious menace to fruit trees on the continent of Europe, whilst in England it has ruined many a plantation and placed certain kinds of apples very largely outside the pale of commercial cultivation, Though the term "canker" is often applied to various open wounds where the bark is swollen and rugged, the true apple canker, as understood in Britain, is a specific disease, and is caused by the minute fungus *Nectria ditissima.* The same fungus also causes canker in the pear, though the disease is not so frequent in this tree as in the apple.

Description.—The general appearance of apple canker will be recognised from the figures accompanying this article. Fig. 1 represents an early stage of the disease, Fig. 2 one which is far advanced. The wounds may occur anywhere on the branches, but are found most frequently at a node or at the junction of a small branch with a larger.

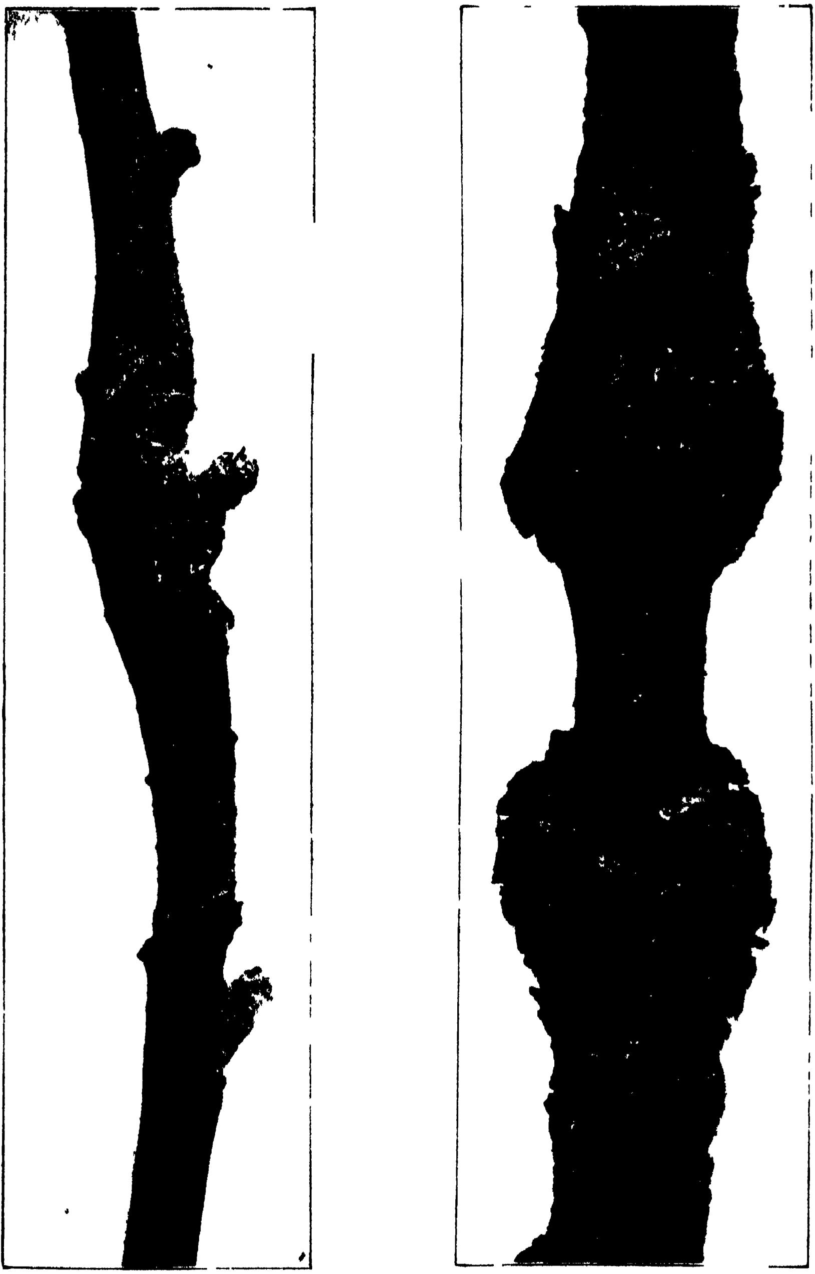
The commencement of the canker-wound and the various stages which follow may readily be observed if a diseased tree is studied with a little care. The young stages will be seen as small depressed areas, which gradually break away from the surrounding part of the shoot and are somewhat darker in hue. Such areas very frequently, but not invariably, originate around a dead twig (Fig. 1), and are caused by the activity of the fungus which has gained an entrance to the tissues. This small damaged area increases in size and usually becomes more or less elongated in outline. The tissue in the central portion dies and gradually decays, so that the damaged area assumes the form of an open wound surrounded in later stages by rugged bark. Such wounds, termed "canker" by gardeners, are found in many plants and may be produced by a variety of causes. In the apple, canker is due to the fungus *Nectria ditissima,* although, as explained below, the injury caused by Woolly Aphis is often very similar in appearance, and in fact the two pests are not infrequently found together and aid each other in the damage they cause. One of the most marked features of apple canker is the presence of more or less regular concentric rings around the wound, and it may frequently be recognised by these even in the absence of the fruits of the fungus.

As the disease progresses the wound enlarges and a mass of swollen tissue, due to the repeated formation of callus by the branch, arises around it. The subsequent behaviour varies under different circumstances and with different varieties of apple. In many cases the wound is confined to one side of the branch and the branch continues to live for many years. In other cases the parasite rings, that is completely encircles, the branch or shoot, as shown in Fig 2, and causes its death. Provided the branch is not ringed the sap continues to flow, and such branches remain alive and may even grow and yield heavy crops of small fruit.

The fruiting bodies of the fungus, by which alone the disease can be identified with absolute certainty, are minute and occur especially in autumn and spring. Those formed in spring and early summer are perhaps the most conspicuous and best known. They occur on various parts of the wound and consist of round, rather tough bodies (perithecia), deep crimson in colour and about the size of a poppy seed. Large numbers of two-celled spores are liberated from these fruit-bodies and are conveyed by rain, wind, insects, etc., to other trees, and thus spread the disease. In late summer and autumn another form of fruit is developed. These show as white or pale pink, very minute spots on the rough bark around the wound. They bear masses of sickle-shaped spores (conidia) and these also serve to spread the disease.

Causes Leading to Attack.—The canker fungus gains entrance to a tree by means of wounds or small injuries, and apart from these the fungus spores are not able to infect the branches. The wounds may be large, such as those caused by hailstones, careless pruning, etc., but minute injuries, as, for instance, cracks in the bark, provide just as efficient means of entry. Other wounds which may frequently lead to canker are frost-cracks and the breaking off of young shoots due to careless picking or pruning. Probably one of the most frequent methods by which the fungus gains admittance is through injuries caused by Woolly Aphis. The soft, swollen tissue produced by the aphis is very apt to become cracked during the winter, and it is probable that when the aphis returns the following season to the wounded areas, Nectria spores are attached to their bodies and introduced into the cracks with the aphis. The aphis attack may usually be recognised by the masses of white, woolly substance excreted from their bodies and by which they are surrounded, although, as stated above, both aphis and canker are not infrequently present in the same wound.

Influence of the Soil.—Although the presence of wounds is essential for successful infection by the fungus, there are two



APPLE CANKER

Fig 1 —Young branch of Apple with a small canker present on the right-hand side. The commencement of the wound is at the base of short side shoot.

Fig 2.—Older branch. The fungus here has not only destroyed the tissues on one side of the branch, but has completely encircled and killed it

other factors intimately concerned with the prevalence of disease. Chief amongst these is the question of location and soil. Canker is always worse on a low site and a clay subsoil, so much so that it is impossible in such positions to grow certain varieties of apples successfully (*e.g.*, Lord Suffield, and Cox's Orange Pippin). The effect of damp, heavy soil is to cause rank growth, which is probably more readily injured by the fungus and more liable to be cracked by severe frost. Although a hill slope and more open soil are desirable much good may be done, where a bad subsoil is present, by careful drainage and by the encouragement of surface rooting. With improved conditions affected trees will sometimes grow out of canker, and by careful pruning, clean, healthy trees may be produced.

Susceptibility of Varieties.—Another factor of great importance is the nature of the variety, some sorts being exceedingly liable to the disease, whilst others are more resistant. Varieties such as Lord Suffield and Cox's Orange Pippin are so prone to attack that they are liable to canker even on good soil, whilst Bramley's Seedling is resistant and will often remain free even when grown on heavy land. The following varieties are amongst those which are most subject to attack :—

Cox's Orange Pippin.
Dumelow's Seedling (Wellington).
Ecklinville Seedling.
Lady Henniker.
Lord Derby.
Lord Suffield.
Peasgood's Nonsuch.
Pott's Seedling.
Ribston Pippin.
Stirling Castle.
Warner's King.
White Transparent.
Worcester Pearmain.

Amongst the varieties less susceptible may be mentioned :—

Annie Elizabeth.
Beauty of Kent.
Blenheim Orange.
Bismarck.
Bramley's Seeding.
James Grieve.
Lane's Prince Albert.
Mr. Gladstone.
Newton Wonder.

Control.—1. Old and badly-diseased trees should be cut down and burned. An exception to this rule may be made if, as occasionally happens, the trees are bearing well.

2. In the case of trees not so badly diseased, cankered shoots and badly-cankered boughs should be cut out. If a sharp lookout be kept at pruning time for the commencement of the canker, affected branches may be removed without loss of symmetry to the tree.

3. In the case of large boughs the canker-patch can sometimes be cut out with a sharp knife or chisel. If care be taken

to cut down well into sound wood, and to protect the exposed surface, the wound may completely heal over, and the bough may thus be saved.

4. All cut surfaces should be covered by a protective substance, such as coal-tar, Stockholm tar, paint, white lead, painters' knotting, styptic, or grafting wax. If nothing better is procurable the surface may be luted with clay. Rubbing earth over the surface, a frequent custom, should not be practised.

5. In certain cases, especially where the variety is very susceptible, the tree may be cut back and top-grafted with a more resistant variety, such as Bramley's Seedling. This practice is extensively adopted by commercial growers and often pays well.

6. Woolly Aphis, which not only itself injures the tree, but frequently also introduces canker, should be kept down. Instructions as to this pest will be found in Leaflet No. 34.

7. Apples are more liable to canker in heavy subsoils and in damp situations. Where a wet, heavy soil is present an effort should be made to drain it. In the case of young trees growing down into an unsuitable soil, the trees should be root pruned, and surface-rooting encouraged. On exceptionally heavy and stiff land-trees may sometimes be planted on the surface and earthed up.

8. When planting a new garden or orchard, varieties resistant to canker, and those which have been found to do well in the locality, should be chosen.

9. Spraying is practically useless, but in order to reduce liability to infection all general sanitary measures should be adopted, and diseased shoots and prunings should be promptly burned.

"Isle of Wight" Disease in Bees.

THE Board have received from Dr. Annie Porter a report respecting some further developments in connection with Microsporidiosis ("Isle of Wight" Disease) in Bees.* The report deals, among other things, with the relation of *Nosema apis* to "Isle of Wight" disease, the grading of cases of the disease with regard to severity of infection, treatment in respect to grading, variations in the virulence of *Nosema apis* and sanitary measures which should be taken for the prevention of the disease. Full publication of the report is reserved until such time as printing on a pre-war scale can be again contemplated, but the general conclusions arrived at by the author may be given here. They are as follows :—

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* Two previous reports on this subject have been published as supplements to this *Journal*, viz., Supplement No. 8, May, 1912, "Reports on the 'Isle of Wight' Bee Disease," price 1*s*., post free; and Supplement No. 10, July, 1913, "Further Report on the 'Isle of Wight' Bee Disease," price 4*d*., post free.

(1) "Isle of Wight" disease of bees is due to *Nosema apis*, and is best and most accurately described as "microsporidiosis."

(2) Five grades of progressive severity of the disease can be established, but both macroscopical and microscopical examination is necessary to determine the presence of the causal organism and the correct estimation of the intensity of the disease, though microscopical examinations often reveal a higher grade of intensity than is seen by the naked eye. It is essential that the young stages of *Nosema*, which produce the ill effect on the host, should be recognised, as in acute cases death supervenes before the spores are formed.

(3) Extended experiments have led to the discovery of two drugs, named in the Report the "brown" and the "white" drug respectively, which, used alternatively, effect a cure in the two early stages and occasionally in the third stage. The two last stages rarely yield to treatment. Complete immunity to disease is not conveyed and reinfection is always possible.

(4) Great variation in the virulence of different strains of the parasite has been established, the variation being sometimes local and sometimes dependent on the race of the bee. The virulence increases when disease passes from a black to an Italian bee, or *vice versa*. The passage of *Nosema apis* through wasps, ants and wax moths also alters its virulence. Dutch bees are more resistant than native bees to a mild strain of *Nosema*, but less resistant to a virulent strain. When a mutual toleration between the host and the parasite is gradually evolved, heavily infected though apparently healthy bees, termed parasite carriers, result.

(5) Numerous external factors influence the progress of epizootics of microsporidiosis among bees. Adequate food supplies, sufficient warmth and proper ventilation of hives, are necessary for the maintenance of health in the hives.

(6) Re-queening is a great aid in the prevention of disease, and in the production of vigorous strains of bees of increased vitality. Aged queens cannot maintain the colonies at maximum size. The pedigree of queens should be kept, and queens raised only from vigorous colonies that work well.

(7) Careful attention by all bee-keepers to sanitary measures in connection with the hive, its occupants and their environment, is essential, both for the prevention of disease and for the successful combating of epizootics, should they appear.

The Spraying of Potatoes.

THE Food Production Department does not propose to issue "a full Report" of the results of the spraying of the potato crop in 1917. Two reasons are given for this course: (1) Although many reports have been received from growers it has not been possible for the officers of the Department to check a large number of the reported results and so ensure that all these reports could be considered of equal value; (2) It is proposed to arrange for exact and extensive records to be kept of the spraying done during 1918, and thus to obtain a large body of evidence that cannot be challenged. It will be remembered that the then newly-started Food Production Department had to undertake a spraying campaign under rush conditions which made it practically impossible to arrange for careful scientific observation to be kept on the effects of the spraying. Between 300 and 400 local reports were forwarded to the Department, however, from civilian sources, and about 50 from military camps where spraying was done. Both budgets of reports show a very large majority of favourable results. For example, an analysis of 305 representative reports received from various sources produces the following figures: (1) Reports indicating decided benefit from spraying, 213; (2) Indefinite, spraying being apparently neither beneficial nor harmful, 66; (3) Cases in which the results of spraying were considered harmful, 26.

Representatives of the Department investigated as many as possible of the reports on cases where damage had apparently been done by spraying. In the majority of cases where harm was done this was traced definitely to (*a*) errors in making up the spraying mixture; (*b*) the influence of acid fumes in the atmosphere, or (*c*) the fact that spraying had been done after the haulm of the potato plant had been previously attacked by fly (aphides). Details have been arranged under the heads of counties, and the authorities of each area from which reports have come are being supplied with the full particulars for their guidance in the future.

The arrangements made by the Food Production Department for the spraying of the 1918 potato crop are now practically completed except in so far as the public support of the Departmental scheme is concerned. Every grower of potatoes should make a point of arranging as soon as possible to buy individually or in combination with other growers a knapsack sprayer and order the necessary chemicals. If the scheme is to work smoothly and successfully it is essential that the public should co-operate thoroughly and promptly. The trade elements engaged in the production and sale of knapsack sprayers have met the Department in a very friendly spirit. The trade has arranged to manufacture certain types of knapsack sprayer which, while retaining the distinctive marks of individual firms, will be made to a specification issued by the Department. These machines will be made in large quantities and sold at about 70*s.* If orders are put in immediately the makers will be able to satisfy all reasonable requirements. The same remark applies to the supply of copper sulphate and soda crystals. It is probable that there will be a shortage of the latter a little later on. Hence the extreme desirability of ordering early. *It should be clearly understood that no order, either for a spraying machine or copper sulphate or soda crystals, may be sent to the Food Production Department.* All orders for these things must be placed with retailers who deal usually in such articles. The Department's main function in this year's scheme is to educate the public in the prevention of potato blight and to advise them how, when, and where to obtain the necessary apparatus. It is not selling any of this apparatus. A staff of lecturers is now touring the country giving addresses, illustrated by lantern slides and drawings, on spraying and potato blight. Any local authority or allotment or similar society desiring such lectures should communicate with the Food Production Department, 72, Victoria Street, S.W. 1.

The Food Production Department has just issued a free booklet on "Potato Disease (Blight) and its Prevention," which can be obtained post free on application to the Food Production Department, 72, Victoria Street, S.W. 1. This is an extremely interesting publication and is illustrated with realistic pictures of blighted potato plants in natural colours, so that anyone may be able to tell whether his crop is affected by blight or not. The history of the disease and its symptoms are both described in great detail, and there is a map showing the extension of the disease in various counties at different dates last year. The tone of the booklet is moderate and scientific, and the claims made for spraying are modestly stated. A very useful list of dates for spraying is given with instructions for making Bordeaux and Burgundy mixtures. There are likewise hints on seed selection, planting distances, earthing up, lifting and storing. A copy of the booklet ought to be in the possession of every gardening, allotment, small holding and farmers' society in the country.

The Maisemore Pig Club.

THE Board have received from the Rural League a copy of a leaflet, addressed to all who wish to keep pigs, describing the successful organisation, on co-operative methods, of a pig club at Maisemore, in Gloucestershire.

The writer of the leaflet, Mr. Alfred E. Driver, the Hon. Secretary of the club and master of the village school, states that owing to the scarcity of feeding stuffs locally, young pigs were being sold off, and there was every likelihood that pig-keeping in that village would come to an end.

In consequence, however, of the propaganda of the Rural League, Mr. Driver consulted the pig owners of the village, and invited the aid of a local farmer, Mr. W. Pearce-Ellis, who was keenly interested in the pig industry.

These preliminaries were so far encouraging that an informal meeting was called; and for this purpose Mr. Driver was able to employ the services of the upper classes of his school in designing and issuing an attractive poster which was placed in prominent positions. Letters also were sent round the parish inviting the attendance of all persons interested.

A large number of parishioners attended the meeting, at which the welfare of pigs, the buying and selling of pigs, and the question of feeding stuffs and prices were keenly discussed.

After a second meeting the immediate formation of a pig club was decided upon, and a committee of five members was formed, one being a lady. A dozen members were enrolled, each one belonging to the working class.

Rules were drawn up on the basis of those suggested by the Rural League, and the club funds were safeguarded and credit was secured by a rule that the pigs of members were to be the property of the club until every debt due to the club by the owner had been settled.

Funds for the purchase of feeding stuffs were obtained in three ways: (1) £12 was lent to the club by the Rural League for nine months without interest; (2) £40 was borrowed from Mr. Pearce-Ellis, the Chairman, at 5 per cent. per annum; (3) Mr. Pearce-Ellis succeeded in raising the sum of £6 by subscriptions from friends interested in the venture. An account was opened with the Gloucester Branch of Lloyds Bank, and all payments were made by cheques, signed by the Chairman, the Secretary and one member of the Committee.

Feeding stuffs were purchased to the best advantage from the West Midland Farmers' Association, and in order to secure full benefits the pig club took one share in this Association. All members requiring pig food give their orders to the Secretary on or before the Friday in each week. The feeding stuff is then purchased and on the next day it is weighed out by the Secretary and one of the Committee. On the following Monday it is despatched to everyone ordering the food, 5 per cent. being charged to each purchaser over and above cost price. The financial results are stated to be surprisingly good.

All house refuse and scraps—an important item—are collected by the pig-keepers themselves, the Secretary having made all the necessary arrangements, so that nothing is wasted.

The club has so flourished that every cottager keeping a pig is a member. The pigs are sold in Gloucester market at most satisfactory prices; in one instance a member of the club made a clear profit of £6 by the sale of his pig.

The Women on the Land.

WOMEN are taking a prominent part in forming County Fruit and Vegetable Collecting Societies for the disposal of surplus fruit and vegetables. A conference convened by the Warwickshire Women's Agricultural Committee has just decided to form a society for that county.

One of the latest occupations taken up by women in connection with agriculture is farriery and smithing. A farmer at Hereford having sent in a request for a woman to do this work —shoeing horses and making and repairing farm implements— the Women's Organisation proposes to fill the place.

All the women who have completed a course of training in forestry have now been placed as forewomen by the Woods and Forests Department.

The women students at Harper Adams College (Salop) who have been training for motor-tractor work have been most successful; and the engineer, who was prejudiced against women labour in the first instance, is now most enthusiastic over their work. Two of them have done so well that they have been kept on as assistant instructresses.

A demonstration and competitive meeting "principally for women" representative of the six North Wales counties took place on Smithson's farm at Rhuddlan on 7th February. The classes included horse and tractor ploughing, milking, hedging, trimming, pruning, trenching, thatching, harnessing, and carting.

A girl of seventeen was awarded three stripes for long service at a Land Women's rally at Carmarthen. She ploughed unaided 25 acres of her father's farm.

Women as Potato Harvesters.—An Oxfordshire farming district furnishes an excellent example of how women are helping on the land in face of all sorts of obstacles. Labour was required for potato harvesting in autumn, and 45 members of the Women's Land Army were secured. The first difficulty was the lodging; the cottagers mostly worked all day at a local Army Stores Depot, and only by an appeal to their patriotism could they be persuaded to rearrange their already well-filled homes in order to make room for the land workers. Then, the majority of the girls had to be boarded, the cottagers being unable to supply meals. The parish hall was lent by the trustees, two old cooking ranges were unearthed and temporarily fitted in, and a woman cook was secured. To procure supplies was not easy. The village possessed only one small store, which was "out" of most necessary articles. The carrying service to the nearest town had been given up—the carrier now serving in the Army—and the train service was unreliable for parcels. In spite of all these obstacles, however, the girls were well and regularly fed. The farmers themselves bought cooking utensils and crockery, and gave potatoes and vegetables, and local residents sent occasional gifts of fruit. Evening amusements were provided at the hall; books, games, a piano, and a gramophone turned up. Thus all these women were housed, fed, and generally cared for in a village that at first sight appeared to offer not the slightest facilities for such an influx of temporary workers. Twenty-four acres of mangold and 116 acres of potatoes were handled. Each picker had 20 to 25 yards length of line to clear, the machine returning to her section every ten minutes, during which time she would have to finish her line and move to the next row. A day's work meant that each girl filled about 120 skips. The farmers expressed themselves highly pleased with the work done by the women, while the latter, on leaving, said they hoped that they might be sent down to the same place next year.

Women's Recruiting Scheme.—So as to prevent overlapping and counter recruiting, it has been decided to make up a Single Women's Land Army composed of three sections : (1) Women for Agriculture and Forestry under the Board of Agriculture ; (2) For forage work under the Forage Committee of the War Office ; (3) For timber cutting under the Timber Supply Department of the Board of Trade. Recruits will be accepted—and in fact are badly wanted—for either of these sections, but it is understood that they will agree to be transferred to either of the other sections if the national interest demands this course. Enrolment is for one year (Class A) or six months (Class B)—those enrolling in Class B, by the way, may not join the Forage Section. Women who have already enrolled for the period of the War in the Land Army can, if they so desire, be enrolled under the scheme as for one year from 1st January, 1916. In reply to inquiries the Food Production Department of the Board of Agriculture state that the Class A woman receives free outfit, free instruction and maintenance at an Instruction Centre or elsewhere, a commencing salary of 18*s* per week, and a guaranteed minimum of £1 per week and upwards after passing an efficiency test, free maintenance if unemployed through no fault of her own, free railway travelling to any job to which she is directed, a service armlet after 30 days or 240 hours' work on the land, a stripe for every six months' work, and the L.A.A.S. badge after two months' approved service. Girls wishing to enrol should apply either to an Employment Exchange, to the Organising Secretary for the district, the District Representative, or the Village Registrar. The address of the nearest Employment Exchange can be obtained at the Post Office.

Destruction of Pests.

ALTHOUGH there is room for more general and effective organisation in the campaign against farm pests, owners and farmers of late have undoubtedly combined much more widely and effectively to this end. Interest in the subject has been extremely active during the past two or three weeks, judged by the number of inquiries received at the Food Production Department. In view of these inquiries it may be well to outline briefly what tenants and owners may do in the direction of dealing with ground game, hares, etc.

The tenant of land ordinarily is entitled to kill any ground game on that land, including hares. He is also entitled to kill such birds as pigeons, rooks, etc. It may be, however, that his crops are being damaged by game, such as pheasants, which he is not entitled to kill, or by rabbits and rooks coming from land not in his occupation. In this case, he must obtain the permission of the Agricultural Executive Committee to kill the pheasants or the rabbits, or other marauders. The Committee have the power to authorise him to shoot pheasants ; they have the same power to authorise him to enter upon any plantation or rookery for the purpose of killing rabbits or rooks, and the Committees use these powers if the birds are not sufficiently reduced by the owner or shooting tenant. It will be seen, therefore, that the farmer who allows his crops to be damaged by any of these forms of " game " as a rule should blame himself rather than " the Government " The Food Production Department is always willing to inquire into any grievance of any farmer or other person under this head. Generally speaking, however, an appeal to the Local Committee will obtain redress. The Committees, as a whole, are sympathetic to the progressive farmer rather than to the landlord from whose land pests may come. In Bedfordshire the other day, for example, a farmer having complained of the damage caused by rabbits that came from a neighbouring estate the Committee appointed a warrener to enter certain fields and plantations and kill the rabbits, the warrener having all the killed rabbits as remuneration. Some of the members of the Committee thought half the rabbits should be given to the owner of the land where they were killed, but the majority of the Committee voted against any such consideration to the owner. In another case half the rabbits were given to the owner of the land and half to the man killing them.

It should be noted, by the way, that there is now no close time for pheasants. Any owner or shooting tenant, as the case may be, can under the present Regulations kill pheasants at any time, and any person may sell or purchase them.

Substitutes for Bare Fallow.

A GOOD deal of the old arable land in all parts of the country has become foul in the last few years, and there is a tendency on the part of farmers to increase the area of bare fallow in order to clean such land effectively during the coming summer. In some cases a bare fallow is justified, but in view of the urgent necessity of securing the maximum production of food in 1918, completely bare fallows must be avoided except when absolutely necessary.

Generally speaking, a bare fallow should not occur on any land which is not of the heaviest quality. Given an average season the foulest light or medium land can be cleaned sufficiently well in early summer to allow of the sowing of a root or forage crop, and even in the worst cases a crop of turnips or rape sown at the beginning of August will provide most useful food and enable the cleaning of land to be completed. Even on the heaviest land, with competent management, much more can be done in the way of cleaning land under a crop than is commonly supposed. For instance, the Food Production Department calls attention to the old plan of ploughing in beans in rows of 3½ ft. or so apart. This width allows of ploughing and scuffling between the rows until the plants are about 2 ft. high. Given a favourable season the land is effectively cleaned with a minimum of hand labour and at least two-thirds of an average crop may be expected. In view of the very high feeding value of beans (they are particularly rich in albuminoids and suitable for the winter feeding of dairy cows) a plan such as that suggested is strongly recommended.

If the spring and early summer are favourable for working between the beans it ought to be possible in a great many cases to secure still further production from the land by adopting the system followed in Oxfordshire and other counties. There it is a common practice, after completing the horse hoeing, etc., of the bean crop, to drill 1 or 2 lb. per acre of white turnip seed about the beginning of June. The bean crop is harvested in the usual way and then the horse hoe is set to work to cultivate between the rows, but no attempt is made to thin the turnips. Sometimes rape seed at the rate of 4 or 5 lb. an acre is sown instead of turnips. On the heavy soils under consideration the turnips or rape should be commenced sufficiently early to allow of the sowing of winter wheat or oats.

Seed Potatoes.

IN a few counties the organisation of the supply of seed potatoes does not seem to have been taken in hand as energetically as it might have been. From a few districts complaint has reached the Food Production Department that the public are in doubt as to the means adopted by the authorities for the distribution of the seed. In all such cases it is desirable that would-be growers of potatoes should take action to clear up the question at an early date. If inquiries made of the Secretary to the

County War Agricultural Committee or other local official are not immediately successful in obtaining a reply, the Food Production Department, 72, Victoria Street, S.W. 1., should be communicated with at once. In most of the counties the collection of orders and the distribution of potatoes seems to be in process of quite effective organisation. Many allotments associations, parish, and other minor authorities are collecting the orders as last year and forwarding them to the Agricultural Executive Committee, which is buying seed in bulk and distributing it through approved seed-potato dealers. In other counties the distribution will be made from the Executive Committee or its Supplies Sub-Committee direct to the Allotment Society, Parish Council, or other minor authority. In only a few counties does there seem to be any difficulty arising.

Successful Mole Draining.

LAST summer the Food Production Department commended to the attention of agriculturists with badly-drained land, who were not in a position to pipe-drain the same, the question of whether they could not mole-drain it. A great many owners and occupiers took the advice of the Department with great advantage to themselves, and there is no doubt that on the whole the method has proved a distinct success. Recently, a demonstration of mole-draining was given at Oak Tree Farm, Burneston, Bedale, Yorks, by the occupier of the farm, with his own plant, before members of the local War Agricultural Committee and a number of farmers of the neighbouthood. The site selected was a large and very wet field of old grass in ridge and furrow. The plant consisted of two 6-h.p. (Fowler) steam engines with cable and winding gear as for ordinary steam plough, the mole-draining plough being attached. Travelling without a hitch at the rate of about three miles an hour the plough did most satisfactory work; and when shortly afterwards several of the channels were opened out they proved to be from 1 ft. 9 in. to 1 ft. 10 in. below the surface and to have water running in them freely. "The demonstration," says the Yorkshire Commissioner of the Food Production Department, "was well attended and was a great success." It is to be hoped that other farmers with the necessary plant and experience of this work will arrange similar demonstrations in other parts of the country.

OFFICIAL NOTICES AND CIRCULARS.

THE following Circular (No. 15/C. 1), dated the 15th January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Circular Letter as to Cultivation of Lands Order, 1918.

SIR,—1. Additional powers required for the furtherance of food production have recently been conferred upon the Board of Agriculture and Fisheries by amendments of Regulation 2M. Other amendments to this Regulation have been made from time to time since the date of the Cultivation of Lands Order, 1917 (No. 3), and the present opportunity has been taken to consolidate all the Orders which have previously been made delegating to Agricultural Executive Committees the powers conferred upon the Board by Regulation 2M into a single Order entitled as above* Copies of the Order are sent herewith ; it supersedes the Cultivation of Lands Order, 1917 (No. 3) (which itself superseded the first Cultivation of Lands Order, 1917), and the two Drainage of Lands Orders of 1917. The Cultivation of Lands (County Boroughs) Order, 1917, which deals with powers under other Regulations besides Regulation 2M, is not affected. The present Order confers certain additional powers upon Agricultural Executive Committees, and does not revoke any of their existing powers, except by a limitation of the power of taking possession of inhabited dwelling houses. The whole of Regulation 2M, so far as it applies to England and Wales, is printed at the end of the Order. But the powers given in paragraphs (*eee*), (*f*), (*k*), (*l*), (*m*), (*n*) and (*o*) of Section (1) are not delegated to Executive Committees ; these paragraphs are distinguished by a black line in the margin.

2. *Taking Possession of Buildings.*—By paragraph (*a*) of Section (1) Executive Committees already have power to enter on and take possession of any buildings situate upon land of which they have taken possession under that paragraph or convenient for the purposes of cultivating that land or of adapting it for cultivation. Under paragraph (*c*) (which has now been entirely altered) Executive Committees obtain power to take possession of any land or buildings required to provide accommodation for persons, machinery, implements, plant, farm produce, stock or animals, employed or used by the Board, or by the Committee on their behalf, for the cultivation of land or for the increase of the food supply of the country. This power will enable Committees to take land or buildings for the purpose of accommodating soldiers, prisoners of war or other persons employed by them on cultivation or drainage, to take possession of buildings in order to house horses, machinery or implements employed or used by them, and so on. It will be found useful, where it is necessary, to take stables for the Department's horses or to take land as a training ground for ploughmen. Where an Executive Committee have taken possession of land or buildings under paragraph (*a*) in order to secure the proper cultivation of the land, they may retain possession of the land or buildings for any of the purposes above stated. It should be noted, however, that this power does not enable the Committee to provide additional buildings for a person who is cultivating land on his own behalf and not on behalf of the Board. Particular attention is called to the provision that a Committee cannot

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* The Order is printed at p. 1280.

take possession of any inhabited dwelling-house either under paragraph (*a*) or paragraph (*c*) without the further consent of the Board. That consent is also necessary (as it was under the revoked Order) for taking possession of "common land."

3. *Repair or Removal of Hedges and Fences and Clearance or Repair of Ditches and Drains.*—The Executive Committees are now enabled by paragraph (*ee*) to compel the occupier of any land to repair or remove hedges and fences on his land. A direction for this purpose may be given in any case in the same way as a notice to cultivate is given under paragraph (*e*). The power to require removal of hedges, and thus effect what is practically a permanent alteration of a farm, should only be exercised after consideration of the views of the owner as well as the occupier of the land.

In addition to the powers already existing to secure the cleansing of streams and water-courses, this new paragraph (*ee*) enables Executive Committees to compel an occupier of land to clear or repair the field drains and ditches on his land whether these are natural or artificial, and a direction for this purpose can be given in the same way as a cultivation notice is given under paragraph (*e*). It is hoped that by the exercise of this power Executive Committees will be able to secure the cultivation of numerous fields which could not otherwise produce a useful crop in their present state of neglected drainage.

It will be observed that the power relates only to existing ditches and drains.

Incidentally this new paragraph removes any doubt as to the works therein referred to being works for the adaptation of land for cultivation, the value of which may be recovered on withdrawal from possession.

4. *Returns.*—The Board have obtained powers under paragraph (*o*) to call for returns from occupiers or managers of any agricultural lands with respect to their cultivation or to the crops or live stock on the land. In order to secure uniformity and to avoid overlapping of returns required under other Regulations, these powers are retained in the hands of the Board and are not delegated to Executive Committees.

The Board themselves propose to arrange for the issue and collection of a form of return to be made by all occupiers of holdings over 20 acres stating the quantity of grass land ploughed and the area of wheat and other crops planted by the end of each month up to the end of April. These returns will be tabulated and the figures for each county will be supplied to Executive Committees for their information.

5. *General Orders.*—It has been found in the past difficult to enforce a general prohibition or restriction of the cultivation of particular crops, such as mustard or strawberries, or the ploughing up of certain classes of land throughout the country, such as land under old leys. Power has now been obtained by the Board to make Orders for such purposes applicable generally or to any special area. In order to secure uniformity in different counties where similar conditions prevail, the power has been reserved in the hands of the Board and is not delegated to Executive Committees. If any Executive Committee consider that a general Order of this kind should be made for their county, their views should be put forward to this Department with a full statement of the reasons.

6. *Penalties for Breaches of the Regulation.*—Section (3), which deals with offences, has been enlarged so as to make any negligent or wilful failure to comply with a notice or Order under Regulation 2M a

summary offence, and is no longer confined to a failure to comply with a Cultivation Order; thus, a failure to repair hedges or to clear drains will be punishable equally with a failure to cultivate. Obstruction or interference with any officer in the execution of his powers under the Regulations is also made a summary offence; as well as a refusal to give up possession of any land or buildings of which possession is required under paragraph (*a*) or (*c*), or a refusal to quit land of which the tenancy has been determined. One reason for thus widening the scope of Section (3) is that it has been considered to be desirable to limit the scope of Regulation 2N so that it no longer has any application to a farm of which possession is taken under Regulation 2M. In no case, however, can a prosecution be instituted by an officer of the Executive Committee for any of the offences specified in Section (3) of Regulation 2M except with the authority of the Board, which is required by Regulation 56 (11).

Notices served under the Regulation should bear the signature of the Chairman of the Committee, unless any other person has been authorised to sign them by a minute of the Executive Committee; and care should be taken to serve any such notice in the manner prescribed in Section (11) of the Regulation and to preserve a record of the service. Where possession is taken of any land or buildings it would be a convenient course to notify the fact in writing to the occupier so that there may be a written record of the commencement of the possession.

7. *Withdrawal from Possession.*—As Executive Committees have already been informed, Section (4) of Regulation 2M has been amended with a view to the recovery of the whole value of acts of cultivation or adaptation for cultivation upon withdrawal from possession. Where the landlord himself resumes occupation, the whole value can be recovered from him as the sole person interested; but where a tenant comes into occupation upon such withdrawal, the adjustment of the claim for recoupment is not so simple. The value to the tenant of the tillages, etc., should be claimed from the tenant on the same basis as upon an ordinary change of tenancy; but expenditure by the Committee on matters of a more permanent character, such as repairs to buildings, mole draining or clearing drains or ditches, may create a value which will have to be apportioned between the landlord and tenant for the purpose of recovery by the Committee. Except therefore in respect of matters for which the tenant accepts the sole responsibility, the negotiations for a settlement should be conducted at the same time with both landlord and tenant. The Memorandum 6 C/1, dated 27th November, 1917, on this subject is cancelled.

8. *Drainage of Land.*—As the Drainage of Lands Orders are now incorporated in the Cultivation of Lands Order, 1918, any action with regard to drainage will now be taken under that Order; otherwise the instructions given in the Circulars F.P. 25 and F.P. 52, and in the Memorandum 5C/1, dated 23rd November, 1917, continue to hold good. There is now, however, an additional power under paragraph (*n*) which enables the Board upon the application of any drainage authority to increase the amount by which their rating power is limited by the local Act. Many drainage authorities established by local Acts are restricted in the levying of rates to a certain limit per acre or per pound of rateable value, and in view of the high prices of coal and labour, such limits have in many cases been found insufficient to enable these authorities to carry on their operations. In view of the increased value of agricultural

produce there should be no hardship in levying a higher rate, which will secure a greater benefit than was the case in the past; and it is vital, for instance, that where the maintenance of pumping is required in order to secure the cultivation of the land within a drainage area, that pumping should not be discontinued. It is hoped therefore that Executive Committees will in any cases of this kind use their influence with drainage authorities to apply to this Department for an increase of their rating powers, which has already been done in more than one instance. The power under this paragraph to override local Acts has been reserved to the Board and is not delegated to Executive Committees. As the increased rates can only be levied while the Regulations are in force, it is not considered to be feasible to increase the borrowing powers of drainage authorities where these are restricted by their Acts.

I am, etc.,
(Signed) ARTHUR LEE,
Director-General.

The Cultivation of Lands Order, 1918.

WHEREAS, under Regulation 2M of the Defence of the Realm Regulations (which, so far as the same is applicable to England and Wales, is set out at the foot of this Order), the Board of Agriculture and Fisheries (hereinafter referred to as "the Board") are empowered, after such consultation with the Food Controller as may be arranged, to exercise certain powers with a view to maintaining the food supply of the country, and to authorise any person, or any body constituted by the Board for the purpose, to exercise on behalf of the Board the powers conferred on the Board by Regulation 2M, and to prescribe the procedure of any such body and the authentication of any notice or other instrument issued by any body or person so authorised.

And whereas the Board, after consultation with the Food Controller, are of opinion that for the purpose aforesaid such Order as is herein contained should be made.

Now the Board of Agriculture and Fisheries do hereby order as follows:—

1. The persons who are for the time being appointed by a county council of an administrative county to act as members of the War Agricultural Committee for the county are hereby reconstituted as the body to exercise in manner herein provided such of the powers conferred on the Board by Regulation 2M as are hereby authorised to be so exercised

2 The body hereby re-constituted shall maintain an Executive Committee, consisting (1) of members appointed by the said body, not less than four nor more than seven in number, unless the Board otherwise direct, and (2) of additional members appointed by the Board. In the case of a county in Wales (including Monmouthshire), two of the members so appointed by the body hereby re-constituted shall be the members representing the Council of the county on the Welsh Agricultural Council. If any vacancy occurs among those members of an Executive Committee who are appointed by the body hereby re-constituted, the Executive Committee may appoint any person to fill the vacancy so arising.

3 (1) The body hereby re-constituted for a county, acting through the Executive Committee, may on behalf and at the expense of the Board, but subject to such directions as to approval of expenditure

or otherwise as may from time to time be given by the Board, and subject also to the restrictions imposed by this section, exercise within the county any of the powers of the Board under Regulation 2M (except the powers conferred by paragraphs (*eee*), (*f*), (*h*), (*l*), (*m*), (*n*), and (*o*) of Section (1) of that Regulation) and appoint such officers and incur such expenses as the Committee may consider necessary or expedient for such purposes; provided always that

(*a*) the Committee shall not enter on or take possession of any common land as defined by this Order, or take possession of any inhabited dwelling-house, without a further consent given by the Board; and

(*b*) where any notice is served under the powers contained in paragraph (i.) of section (1) of the Regulation such notice shall contain a provision to the following effect:—

> This notice shall take effect at the expiration of seven days from the date of service hereof, unless before such expiration notice of appeal to the Board of Agriculture and Fisheries is given in writing to the Secretary to the War Agricultural Executive Committee, and in the event of any such appeal this notice shall take effect on such date (if any) as the Board shall determine after considering the appeal.

(2) The rights of any person dealing with the Committee shall not be affected by any question as to compliance by the Committee with any directions so given by the Board to the Committee or the requirement of consent in the case of common land or an inhabited dwelling-house.

4. An Executive Committee shall from time to time report their proceedings to the body re-constituted by this Order for the county, but the acts of the Committee shall not be subject to confirmation by that body.

5. A member of an Executive Committee shall not take part in any decision of the Committee which relates to land of which he is the owner or occupier, or the agent of the owner or occupier, or enter into any contract with the Committee, unless such contract has been approved by the Board.

6. Accounts shall be kept by an Executive Committee of their receipts and expenditure and be open to inspection by any officer of the Board, and those accounts shall be made up and audited in such manner as the Board shall direct.

7. An Executive Committee shall appoint a Chairman of the Committee. At any meeting at which the Chairman is not present a person appointed by the meeting shall be entitled to act as Chairman of the Committee. At any meeting of an Executive Committee the Chairman shall, in case of an equal division of votes, have a second or casting vote.

8. The quorum proceedings and place of meeting of an Executive Committee shall be such as the Committee determine.

9. The proceedings of an Executive Committee shall not be invalidated by any vacancy among its members, or by any defect in the appointment or qualification of any of its members.

10. Minutes of the proceedings of an Executive Committee shall be kept in a book provided for that purpose and a minute of those proceedings signed at the same or the next ensuing meeting by a person

describing himself as, or appearing to be, Chairman of the meeting at which the minute is signed shall be received in evidence without further proof.

11. Any notice, direction or other instrument signed by a person describing himself as, or appearing to be, Chairman of an Executive Committee shall be received in evidence without further proof as a notice, direction or instrument issued by the Executive Committee

12. Until the contrary is proved an Executive Committee shall be deemed to have been duly constituted.

13. An Executive Committee may, subject to any directions given by the Board, appoint such sub-committees as the Committee thinks fit. A sub-committee may consist either wholly or partly of persons not being members of the Executive Committee.

14. In this Order, the expression "common land" includes any land subject to be enclosed under the Inclosure Acts, 1845 to 1882, and any town or village green and any other land subject to any right of common.

15. The Cultivation of Lands Order, 1917 (No. 3), the Drainage of Lands Order, 1917, and the Drainage of Lands Order, 1917 (No. 2), are hereby revoked, but so that such revocation shall not affect the previous operation of any such Order or anything done under it, or affect any right or liability acquired or incurred under any such Order and any reference in any document to any Order hereby revoked or to any body constituted by any such Order shall be considered as a reference to this Order or to the body reconstituted by this Order.

16. This Order applies only to administrative counties in England and Wales.

17. This Order may be cited as the Cultivation of Lands Order, 1918.

In witness whereof the Board have hereunto set their Official Seal this eleventh day of January, nineteen hundred and eighteen.

(Signed) F. L. C. FLOUD,
Assistant Secretary.

REGULATION 2M SO FAR AS THE SAME IS APPLICABLE TO ENGLAND OR WALES.

[NOTE —Those paragraphs containing powers which are not delegated to Agricultural Executive Committee are indicated by a black line in the margin.]

"2M. (1) Where the Board of Agricultural and Fisheries, after such consultation with the Food Controller as may be arranged, are of opinion that, with a view to maintaining the food supply of the country, it is expedient that they should exercise the powers given to them under this Regulation, the Board may—

"(*a*) Enter on and take possession of any land which in their opinion is not being so cultivated as to increase, as far as practicable, the food supply of the country, and, after entry thereon, do all things necessary or desirable for the cultivation of the land or for adapting it for cultivation; and for such purposes enter on and take possession of any buildings on the land or convenient for such purposes; and

"(*b*) Take possession of any machinery, implements of husbandry or plant (other than machinery, implements or plant in the possession or under the control of a dealer or manufacturer), or any farm produce, stock, or animals, which, in the opinion of the Board, are required for the cultivation of land or the increase of the food supply of the country; and

" (*c*) provide accommodation for persons, machinery, implements of husbandry or plant, farm produce, stock or animals, employed or used by the Board for the cultivation of land or the increase of the food supply of the country, by taking or retaining possession of any land or buildings; and

" (*d*) utilise any water supply or motive power for any such purposes; and

" (*e*) by notice served on the occupier of any land require him to cultivate the land in accordance with such requirements as the Board may think necessary or desirable for maintaining the food supply of the country and may prescribe in the notice; and

" (*ee*) by notice served on the occupier of any land require him in accordance with the terms of the notice to adapt the land for cultivation by repairing or removing any hedge or fence on the land, or by clearing or repairing any ditch or drain, whether natural or artificial, by which the land is capable of being drained; and

" (*eee*) by Order, applicable generally or to any specified area, and published in such manner as the Board may consider to be best adapted for informing persons thereby affected, prohibit or regulate the use of land for the cultivation of any crop specified in the Order and by any such Order require the ploughing up within such time as may be specified in the Order of any land in use at the date thereof for the cultivation of any such crop; and

" (*f*) by notice served on the tenant of any land which or part of which, in the opinion of the Board, is not being so cultivated as to increase as far as practicable the food supply of the country, determine his tenancy of the land on such date as may be specified in the notice, or, on the application of the landlord by Order, authorise him in any such case to determine the tenancy in accordance with the terms of the Order; and

" (*g*) after entry on any land arrange for its cultivation by any other person whether by contract of tenancy or otherwise; and

" (*h*) where, in the opinion of the Board, any land is injured or is likely to be injured by any such neglect on the part of the proprietor or occupier of any other land in relation to the maintenance of banks or the cleansing of channels as is mentioned in Section fourteen of the Land Drainage Act, 1847, and subject to, and after the expiration of seven days from, the service of such notice as is required by that section, exercise such powers of executing all necessary works and recovering the expenses thereof as are by that section conferred on the proprietor or occupier of any land which is injured by any such neglect, and for any such purpose to enter on any land without any warrant or authority; and

" (*i*) by notice served on the occupier or person in control of any dam, mill, lock, sluice, weir, or other structure affecting the flow of water in any river or stream require such occupier or person to keep open or closed any mechanical appliance by which the inflow or outflow of water is capable of being regulated during such times and in such manner as the Board, having regard to the use by such occupier or person of the structure and of the water thereby impounded, consider to be necessary or desirable for the prevention of floods or for the draining of land adjoining or near the river or stream; and

" (*j*) where, in the opinion of the Board, any land is injured or likely to be injured by flooding or inadequate drainage which might be remedied wholly or partially by the exercise of powers which are conferred by any general or local Act, or by an award made under any Act, or by any Commission of Sewers, and which are not being exercised, or in the opinion of the Board are being insufficiently exercised, exercise any such power and also any power conferred by any such Act or award or Commission for defraying the expenses so incurred or for any purpose incidental to the exercise of any such power ; and

" (*k*) enter on or take possession of any dam, mill, lock, sluice, weir, or other structure affecting the flow of water in any river or stream, and remove or repair or alter or maintain and use the same where such action is in the opinion of the Board necessary or desirable for the prevention of floods or for the drainage of agricultural land ; and

" (*l*) for the purpose of removing any obstruction to or otherwise improving the flow of water in any river or stream, or maintaining or improving the banks of any river or stream or any sea defence or drainage outfall, enter on the river or stream or any land adjoining or near the river, stream, defence, or outfall ; and

" (*m*) where any expenses are incurred by the Board in the exercise of any of their powers under paragraphs (*k*) or (*l*) of this Regulation, recover those expenses, so far as they are directly attributable to the default of any person in carrying out his obligations under statute or otherwise, from that person ; and

" (*n*) on the application of any drainage authority empowered by a local Act to levy rates to a limited amount, by Order increase the amount that may be so levied ; and

" (*o*) by notice served on the occupier of any agricultural land or the person having the management of any such land require him to make within such time and in such form and to such person as the notice may prescribe a return in writing with respect to the cultivation of the land or the crops or live stock thereon or any other matter as to which the Board may desire information for the purpose of the proper exercise of their powers under this Regulation, but so that no such return or any part thereof shall be published or disclosed except for the purposes of a prosecution under this Regulation.

" (2) An occupier of land may, with a view to maintaining the food supply of the country, submit to the Board a scheme for the cultivation of the land in a manner not consistent with the contract of tenancy of the land, and the Board, if satisfied that the adoption of the scheme is necessary or desirable for the maintenance of the food supply, may direct that the land shall be cultivated in accordance with the scheme, subject to any modification which the Board may think fit to make therein.

" (3) If any person obstructs or otherwise interferes with or impedes any officer in the execution of his powers under this Regulation, or discloses or publishes any return or part thereof in contravention of this Regulation, or negligently or wilfully fails to comply with the requirements of any Order made under this Regulation, or with any condition subject to which a licence under any such Order has been granted, or, being an occupier of any land or building of which the Board require possession, or of which the tenancy of the occupier has been determined by notice served under this Regulation, without lawful excuse, refuses to give possession thereof to the Board or to quit such land or building, or, having been served with a notice under this Regulation requiring him to do any act, negligently or wilfully fails to comply with the requirements of the notice, or, where the notice requires him to make a return, makes a false return, he shall be guilty of a summary offence against these Regulations.

"(4) If the Board at any time withdraw from possession of any land of which possession has been taken under this Regulation, they may recover from any person then interested in the land as owner or tenant or otherwise, such amount as represents the value to him of all acts of cultivation or adaptation for cultivation executed by the Board; such amount to be determined, in default of agreement by a single arbitrator under and in accordance with the provisions of the Second Schedule to the Agricultural Holdings Act, 1908.

"(5) Any person authorised by the Board in that behalf may, for the purposes of this Regulation and upon production if so required of his authority, enter on and inspect any land or building and inspect any machinery, implements of husbandry, farm stock or produce thereon.

"(6) The Board may with respect to any land or land in any district authorise any person or any body constituted by the Board for the purpose to exercise on behalf of the Board any of the powers of the Board under this Regulation and prescribe the procedure of any such body, and the authentication of any notice or other instrument issued by any body or person so authorised.

"(7) The powers conferred on the Board by this Regulation shall be in addition to and not in derogation of any other powers of the Board.

"(8) In this Regulation the expression 'cultivation' includes use for grazing and the expression 'cultivate' has a corresponding meaning.

. . . . . .

"(11) Any notice under this Regulation may be served on the person to whom it is to be given either personally or by leaving it for him at his last known place of abode or by sending it through the post in a registered letter addressed to him there."

Progress under the Food Production Scheme.—Upwards of 5,200 horses have been issued to farmers up to 18th January, 1918, under the Food Production Department's scheme. Since the initiation of the horse-ploughing scheme in the West Riding of Yorkshire nearly 770 acres have been ploughed by the teams lent to farmers.

Ploughing.

In Derbyshire it is stated that the promises to plough are now well ahead of the quota of 30,000 acres; and that from 8,000 to 10,000 had actually been ploughed up to 15th December, much of this land having been dealt with without pressure from the Committee or the service of Orders. A member of the Derbyshire Committee, by the way, promised farmers in his neighbourhood that if they would plough double the acreage asked for by the Committee he would give them a ton of lime for every additional acre ploughed. "The ploughing has been done, and the lime has been ordered and is being delivered."

The Commissioner for Gloucestershire, commenting on the first five reports under the new survey, says that "great hopes are entertained that the maximum of 50,000 acres will be exceeded."

From Herefordshire it is reported that 30,714 acres of the 40,000 required have been scheduled.

*German Prisoners for Ploughing.**—It is stated by the Food Production Department that the Government is placing at the disposal of the County Agricultural Committees a large number of German prisoners who are skilled ploughmen. They will be distributed over the country in groups of 30 or 40 men, four or five groups in each county, and will be employed in ploughing and other tillage operations within a radius of about five miles from each centre. The groups will be housed in depots selected by the Food Production Department and approved by the War Office. In so far as this is practicable the centres will be formed near market towns and railway stations. The prisoners will be guarded whilst at the central depots, and during the day they will work in gangs of four or five men under the supervision of English soldier and policeman ploughmen, these latter acting as gang foremen. The prisoners required to man teams in outlying districts will be transferred to and fro by wagonette or lorry, or train.

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* See also Notices at pp. 1289 to 1296.

The common idea that very few German prisoners have been employed in useful work in this country is incorrect—some 6,000 having been employed on the land for some time past. The addition of about 4,000 skilled ploughmen with horses and implements supplied by the Government will make a material difference to the labour supplies of the farmer in connection with the increased acreage of arable land, especially as they will be available for harvesting and other farm work.

THE following Memorandum (No. 22/C. 1), dated the 25th January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Entry on Land for Ploughing.

It has been reported to the Department that in some districts, serious delay is occurring in carrying out the ploughing programme owing to the fact that some farmers who have received orders to plough, and who are unable to do the work themselves, will not, on the plea that the charges are too high, or some other unreasonable ground, enter into contracts for the ploughing to be done by the Department's tractors or by the plough teams under the control of the Committees. The result is that there is not only an unnecessary waste of time and money, owing to the fact that programmes of work for the tractors or horse teams cannot be made to the best advantage, but a risk that the ploughing may not be done at all in time to be sown this spring.

The Director-General desires, therefore, once more to remind Committees that the Cultivation of Lands Order authorises them to enter temporarily on any land for the purpose of doing specific acts of cultivation or adaptation for cultivation, and to recover from the owner or occupier such amount as represents the value to him of the work done.

If Committees are of opinion, for instance, that certain fields should be ploughed by motor tractors or other means, and the occupiers refuse or fail to enter into contracts with the Committee for the work to be done, the Committee should enter temporarily and do the work themselves. If the occupier subsequently refuses to pay the cost the Committee should take proceedings for recovery of the amount due in accordance with paragraph 4 of Regulation 2M.

Action on these lines may be taken by Committees without the necessity of obtaining the previous sanction of the Board in each case. In order to avoid any unnecessary delay it might be well for Committees, in connection with their ploughing programme, to pass a general resolution authorising entry under Regulation 2M on all the lands in respect of which Orders to plough under paragraph 1 (*e*) of Regulation 2M have been issued, so that in case any of the farmers fail or refuse to sign contracts entry may be made and the ploughing done forthwith without having to wait for the next meeting of the Committee. At the same time every endeavour should be made to conclude voluntary contracts with the farmers, so as to avoid the exercise of the powers of the Regulation except where absolutely necessary.

The resolution suggested in the previous paragraph might be in the following terms :—

"The ....Agricultural Executive Committee, in pursuance of the powers conferred upon them by the Cultivation of Lands Order, 1918, hereby resolve, under paragraph 1 (*a*) of Regulation 2M of the Defence of the Realm Regulations, to enter on all land in the County of ...., in respect of which a notice has been served upon the occupier by the said Committee under the said Order and Paragraph 1(*e*) of the said Regulation 2M, requiring him to plough up and cultivate the land for the harvest of 1918, and in respect of whichthe occupier fails on demand to enter into a contract with the said Committee for the ploughing of the land referred to by the motor tractors or horse-plough teams under the control of the said Committee, and hereby authorise ...., their Executive Officer, to enter on and take possession of such land on behalf of the Executive Committee.

The officer authorised by the resolution should report to the Committee the cases in which he has taken possession, and the acreage involved in each case. The Committee on receipt of such reports should pass a resolution confirming the officer's action, specifying the lands referred to.

THE following Memorandum (No. 23/C. 1), dated the 25th January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Orders to Plough Up Grass Land: Effect on Tenants' Covenants.

The following Letter, dated the 15th January, 1918, written by the President of the Board of Agriculture to Sir John Grant Lawson, Bart., is circulated for general information :—

DEAR SIR JOHN LAWSON,—I am much obliged to you for drawing my attention to the notes in the *Yorkshire Post* of 29th December, 1917, in which it is suggested that a tenant upon whom an Order for the breaking up of grass land has been served under the Defence of the Realm Regulations must pay to the landlord the cost of putting down the land once more to grass.

The view put forward is based upon a misconception of Section 2 of the Courts Emergency Powers Act, 1917. That section absolves a tenant who breaks up grass land in accordance with such an Order from any liability to make any payment to the landlord. It deals, however, with all kinds of tenancies, urban as well as agricultural; and applies not only to Orders which restrain a person from doing any act, but also to Orders which compel him to carry out a particular work, such as the breaking up of grass land. The provisos at the end of the section, which have given rise to the doubt in the mind of the writer in the *Yorkshire Post*, apply only to cases where some restriction has been imposed, and have therefore no application where an Order has been made which enjoins the breaking up of grass land.

The conclusion of the matter, therefore, is that where the tenant's agreement or lease either prohibits him from breaking up grass land or makes him liable for a money payment if he does so, an Order under the Regulations enables him to break up the land without becoming liable to pay any penalty or to bear the cost of putting down to grass again. If the owner suffers any direct or substantial loss, he is entitled to apply for compensation to the Defence of the Realm (Losses) Commission.

As I understand from yourself and from other correspondents that the article in question has caused considerable anxiety to farmers, not only in Yorkshire but in adjoining counties, I propose communicating this letter to the Press.

(Signed) R. E. PROTHERO.

THE following Circular Letter (No. 52/M. 2), dated the 29th January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Increased Use of Steam Tackle.

SIR,—1. The Department are anxious that between now and the end of the ploughing season the maximum use should be made of the limited number of sets of steam tackle available in England and Wales.

2. Some farmers have for years relied on steam ploughs to supplement the work done by their own horses, and steam ploughing contractors will doubtless continue to receive direct from farmers a large amount of work, but, in order that sets may be kept fully employed, it will be necessary for Agricultural Executive Committees to provide additional work

3. In the Circular Letter sent to your Committee on the 8th December (Ref. No. 20/M. 2), it was suggested that steps should be taken at once to select suitable grass land to be broken up in your area by steam tackle. So far as the Department can ascertain, effect has been given to this suggestion in only a very few counties, and in certain cases where action has been taken, schedules including a large proportion of land unsuitable for steam cultivation were sent to the steam ploughing contractors.

4. Many Committees appear to consider that only land unsuitable for ploughing by either horses or tractors should be left to be ploughed by steam. This is not the case. The best results from the national point of view can only be obtained by employing steam tackle, equally with motor tractors, on land suitable for mechanical cultivation. The size of the field and its accessibility from the road (especially during the winter months) are both matters of special importance in selecting land for steam ploughing. When used in large fields, steam ploughs turn out twice the work which they can do in the same time when employed in small fields, or on high ridge and furrow land.

5. The work to be undertaken during the next three months will be so great that, with efficient organisation, all the horses, motor tractors and steam tackle available should be kept fully employed, and the Department consider it exceedingly unfortunate that any steam sets should be kept standing idle for want of work, or employed on land which will not yield the best results.

6. In the circumstances it is hoped that your Machinery Sub-Committee will not hold up the ploughing of scheduled land in order that work may be reserved for the Government tractors, but will make it their business to see that lists of land to be ploughed are supplied at

frequent intervals to the Steam Tackle Representative on the Sub-Committee if there is one, or, if there is not, the list should be sent direct to the steam-ploughing contractors who work in your area, the names and addresses of whom can be obtained from this Department.

7. The aim of your Committee in this connection should be to provide contractors with particulars of land for which cultivation orders have been issued, and leave them and the farmers to arrange the terms on which the work will be carried out. Any failure on the part of steam plough owners to carrry out work provided for them by your Committee will be immediately investigated by the Department on receipt of particulars from you.

I am, etc.,
(Signed) H. L. FRENCH,
General Secretary.

THE following Memorandum (No. 24/L. 2), dated the 22nd January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

German Prisoner Ploughmen.

1. Advance copies of the scheme for the employment of German prisoner ploughmen are enclosed* for the information of Agricultural Executive Committees. The full scheme is being printed, and printed copies will be sent in the course of a few days.

In order to afford more time to the Executive or District Committees to organise work for the full number of teams which will be attached ultimately to each group, it has been decided to supply only half the number of horses in the first instance. This will give an opportunity of testing the proficiency of all the prisoners as ploughmen, and arranging for the exchange of any proved to be unskilled, before the remainder of the horses are dispatched.

2. Prisoners for whom horses have not been supplied can be employed on ordinary agricultural work, such as hedging, ditching, etc., within a five-mile radius of the Depot, provided they are sent out and worked in gangs of four or five, in charge of an English soldier (acting as gang foreman). In such case, the rates to be charged will be the local rate with a minimum of 5*d.* per hour. They can also be sent out to farmers requiring ploughmen under the conditions of paragraph 14 of the scheme.

3. On being advised that the War Office have approved the premises for housing prisoners, the Department's Sub-Commissioner, or the person who has been dealing with the selection of premises, should, in conjunction with the Horse Officer for the county, at once select suitable premises for stabling the horses likely to be required for work in the vicinity of the Depot (say two miles), as well as premises for the storage of forage, implements, etc. These premises should be within easy reach of the place where the prisoners are housed so that the prisoners can attend to the feeding and management of such horses as are stabled there, and prepare forage for issue weekly to outlying teams. The Department, on receiving particulars as to these premises, will arrange for acquisition and adaptation.

4. The Horse Officer will be responsible for securing suitable stabling for the other horses, to be worked in outlying districts, say, over two miles from the depot.

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* See below for full scheme.

5. The Executive Committee should arrange for one of their officials (preferably the Horse Officer) to consult with the Commandant of the Agricultural Company and select for each depot a non-commissioned officer and the requisite number of soldier ploughmen (one to every five prisoners) to undertake the duties outlined in paragraphs 3, 4 and 9 of the scheme. The soldiers should be transferred to the place where the Depot is situated a few days before the prisoners arrive, in order to take over the horses, harness, tackle, forage, implements and carts, so as to enable the prisoners to commence work without delay.

6. To prevent loss of time the Executive Committee should see that contracts are arranged for sufficient ploughing and other work, and it would be well to have at least 10 days' work always in view.

Work in outlying districts should be so organised as to admit of as much as possible being reached without too frequent a change of stabling, and to allow, say, two gangs of prisoners to be conveyed to their work at one journey of the waggonette or lorry.

7. Committees will observe that they will be responsible for collecting from farmers the amounts due for work done by prisoner ploughmen stationed in their county, whether they are engaged with Government horses or are employed by farmers for ploughing with their own horses, or for ordinary agricultural work (paragraph 2 above), but this will not apply in the case of prisoners accommodated by farmers on their own holdings.

THE following Memorandum (No. 50/M. 1), dated the 28th January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

German Prisoner Ploughmen: Horse Officers and Commissioners.

With reference to paragraph 11 of the scheme, dated 22nd January, 1918, for the employment of German prisoner ploughmen, which has been forwarded by the Department to your Committee, it is to be understood that the implements will be under the charge of the County Executive Committee, to whom the Horse Officer will be responsible for acknowledging receipt and for their custody.

Spare parts for these implements will have to be purchased by the Executive Committee from local implement dealers, who will be notified by this Department as to the types of implements which are being sent to each county.

In view of the large number of implements required to supply the prisoner groups throughout England and Wales, it will be impossible for the Department to meet further demands from Executive Committees for implements required for ordinary gang work until all the groups of prisoners have been fully equipped, and only those orders for which consignment notices have already been sent to Executive Committees will be executed

Executive Committees are hereby authorised to purchase, or hire locally, ploughs or any other necessary implements required for work under part "B" of F.P. 92. Accounts for these implements must be sent to this Department with a certificate to the effect that the goods in question were received in good working order and repair, and that the contract price is considered by the Executive Committee fair and reasonable.

THE Food Production Department have issued the following Notice (F.P. 175/L. 2) respecting the employment of German prisoner ploughmen on the land :—

Employment of German Prisoner Ploughmen: Food Production Department Scheme.

1. The Government has decided that a large number of German prisoners, selected as being skilled ploughmen, shall be sent to this country to assist in the ploughing and subsequent cultivation of the additional land to be cropped in time for the 1918 harvest.

In order that these prisoners may be employed without delay, groups of from 30 to 40 men will be sent to four or five selected places in each county and made available to assist with ploughing and other tillage operations within a radius of about five miles from each centre.

2. The group of prisoners will be housed in suitable depots selected by the Food Production Department and approved by the War Office. The centre for these depots will be determined after consultation with the Executive Committees in order to discover in what districts the teams can be most usefully employed. So far as possible centres will be formed near a market town and railway station. The premises for housing the prisoners will be acquired and adapted by the War Office, who will be responsible for the control, feeding, etc., of the prisoners.

3. The prisoners will be guarded whilst at the depot, but during the day they will be sent out without guards in gangs of four or five to work under the supervision of an English soldier ploughman or policeman ploughman (who will take part in the ploughing work and be known as "gang foreman"), with teams of horses supplied by the Food Production Department, or singly to farmers in the locality who are short of ploughmen, under the conditions outlined in paragraph 14.

4. For work within easy reach of the depot the horses will be stabled near at hand, but for work on land situated further away teams will be stabled as near as possible to their work, and a soldier will be billeted near by to take charge of them between the intervals of work and to get them fed before the prisoners arrive each morning.

5. The prisoners required to man the teams in outlying districts will be transferred to and from the depot each day in some suitable vehicle such as a wagonette or lorry, or, when possible, by train. Whilst away from the depot they will be in charge of the gang foreman, and supplied with suitable rations for their mid-day meal.

The five or six teams constituting the gang must be kept working, so far as possible, in one field at a time to facilitate the supervision of the work.

6. Farmers will be charged for the various tillage operations undertaken at piece-rates, which, for ploughing, must be according to the scale already notified for team ploughing under Memorandum 5/L. 2, dated 30th November, 1917, viz. :—

Light land (2 horse)	20s. per acre.
Medium land (2 horse)	25s. ,,
Heavy land (3 horse)	30s. ,,
,, (4 horse)	35s. ,,

For subsequent operations the charges will be according to a scale of acreage prices submitted by the County Executive Committee to the Food Production Department and approved by them in accordance with the requirements of the Memorandum 5/L. 2, referred to above.

7. Whilst the County Executive Committee will be responsible for organising the work to be undertaken by gang teams (making contracts with farmers, collecting charges due, etc.), so far as possible they should delegate the work to the District Committee in whose area the depot is situated, or, if more than one rural district is served from the centre, should allocate the teams between the District Committees interested, making each responsible for keeping the teams allotted fully employed.

8. The Horse Officer is primarily responsible for the proper care and condition of the horses worked in these gangs, or used for conveying prisoners to and from the depot, but District Committees and Parish Representatives should be ready to assist him in this work.

9. For each depot a non-commissioned officer, who should not be above the rank of corporal, should be employed to supervise the despatch of gangs each day in accordance with the instructions received from the District Committee or person organising gang work in the area served. He should also be charged with the duties of keeping weekly records of the work done by each gang, and forage issued, the care of implements, reporting cases of sickness among the horses, and be generally responsible for the discipline of the gang foremen. Any slackness or misbehaviour of prisoners whilst out at work should be reported to the non-commissioned officer in charge of the prisoners of war.

Suitable non-commissioned officers should be selected from agricultural companies by the Horse Officer, or some other representative of the Executive Committee, in consultation with the Commandant of the Agricultural Distribution Centre.

10. The forage for horses will be supplied by the Army Service Corps, as recently arranged for ordinary gang teams. It will be sent to each centre where it should be prepared, the necessary rations for the gangs stabled in outlying districts being issued weekly. By fixing a scale of rations suitable to the period of the year it should be possible to keep a strict account of the forage required and used by the gangs attached to each centre.

11. The necessary farm implements will be supplied for the gangs attached to each centre, including ploughs, harrows, cultivators, drills, rollers, horse-hoes, carts, self-binders, etc.

12. With regard to the stabling required, permanent accommodation must be secured near to each depot for the number of teams likely to be engaged on work within easy reach, and temporary accommodation secured as required for the teams working at a distance. In this connection attention is drawn to the new powers provided in paragraph 1 (*c*) of Defence of the Realm Regulation 2 M.

Storage accommodation for implements, forage, etc., should be obtained near each depot. This will enable arrangements to be made for chaffing and crushing before forage is issued.

13. At a later date it may be possible to attach some ordinary prisoner labourers to the various ploughing centres to undertake manual work, such as hedging, ditching, hoeing, etc., in the district served, the work done being charged for at the current hour or piece-rates applicable for ordinary civilian labour, based on a minimum rate of 5*d*. per hour.

14. If any farmer in the vicinity of a depot desires the services of one or two prisoner ploughmen for a few days to work teams which would otherwise be standing idle, he will probably be able to secure them on giving a few days' notice to the non-commissioned officer in

charge of the depot, provided convenient arrangements can be made for handing over the prisoners each day to the farmer and for their return to the depot before dark.

In such cases farmers will be made responsible for the safe custody and control of the prisoners during the day, and will be required to pay the Executive Committee for their labour at the rate of 5½*d*. per hour.

15. Farmers desiring to employ prisoner of war ploughmen or agricultural labourers as whole-time workers, boarding and lodging them on the farm, should apply to the County Executive Committee, who, if they approve the application, will forward it to the General Officer Commanding in Chief of the Command. Special forms for these applications will be supplied by the Food Production Department. Executive Committees must not approve any application that involves prisoners being lodged otherwise than with the employer without obtaining direct proof that the person by whom they are to be housed fully consents.

The current local rate of wage will be charged in respect of prisoners so engaged subject to a deduction of 15*s*. per week for board and lodging. The conditions governing the employment of prisoners in the manner described in this paragraph is outlined in War Office letter 0103/9715, 17/1/18, an extract from which is appended. The payment for the prisoners in such cases will be made by the farmer to the Commandant direct.

16. The rates of Army pay to be received by the prisoners of war will be decided by the Commandant of the prisoners of war, after consultation with a representative of the Agricultural Executive Committee or District Committee organising the work.

Accounting Arrangements.

17. Charges for the services of the prisoners of war to whom these instructions apply (otherwise than those prisoners placed out under paragraph 15) will be collected by the County Executive Committee and duly brought to account in the quarterly account rendered to the Department. Committees will note that they are responsible for collecting charges for the services of these prisoner ploughmen even when they are not engaged with Food Production horses.

18. All payments falling to be made by an Executive Committee under these instructions should be charged in the Committee's accounts to the "Horse-ploughing Scheme (F.P. 92)."

APPENDIX.

Conditions of Employment of Prisoners of War Accommodated on Farms or Holdings. (*W.O. Letter* 0103/9715 *P.W.* 3. 17/1/18.)

(I.) Combatant prisoners of war may, on the recommendation of the County Agricultural Executive Committee, be handed over to employers. Applications will be forwarded to Command Headquarters who will, before giving approval, consult with the Chief Constable of the County. as to the advisability of sanctioning such applications. The prisoners of war will be furnished from parent camps or agricultural depots already instituted (on sanction being given by this office). Not more than three prisoners of war can be allotted to an employer under this scheme, except in special cases which may be sanctioned by the General Officer Commanding-in-Chief of the Command.

(II.) Commandants of the nearest prisoners of war camps or agricultural groups, whichever is considered most suitable, will exercise supervision over these prisoners of war.

(III.) The employer will be required to employ them for at least a fortnight. He will undertake to be responsible for their safe custody and will take due precaution to see that they are not interfered with by the inhabitants.

(IV.) On prisoners of war being handed over, their arrival will be at once notified to the local police by the employer.

(V.) Commandants will furnish employers with a descriptive roll of each prisoner of war handed over to them.

(VI.) If at any time a prisoner of war is found to be absent, the employer will at once inform the local police and the Commandant by the quickest possible means.

(VII.) Prisoners of war will be required to work for such hours daily as are customary for agricultural labourers in the district. No work will be performed on Sundays, except the milking of cows, and attending to live stock.

(VIII.) The employer will house the prisoners of war in healthy, comfortable and warmed premises. He will supply straw to fill palliasses as well as the necessary cooking utensils, crockery, artificial light, facilities for washing, etc.

(IX.) Three meals will be provided per day—and in no case on a less generous scale than that of an ordinary civilian farm labourer.

(X.) Any misconduct on the part of a prisoner of war will be notified by the employer to the Commandant. The services of the local police should be called in, in case of necessity.

(XI.) In case of medical assistance being required the employer will call in the local practitioner. The fees (ordinary labour rates) will be paid to the doctor direct by the State. His bill should be forwarded to the Commandant, who will submit it to the Command-Paymaster—duly certified. In case of severe illness, requiring admission to a hospital, a prisoner of war will be transferred under the orders of the Commandant to an authorised hospital. Combatant prisoners of war will not, except in cases of extreme urgency, be transferred to any civil infirmary or hospital without specific instructions.

(XII.) Prisoners of war will be supplied by Government with clothing and bedding.

(XIII.) The employer will pay the Commandant for the men's services at the minimum rate of 25*s.* per week—subject to deductions of (*a*) 15*s.* per week in respect of board and lodging, and (*b*) of such further sum as the Commandant may direct shall be paid each week by the farmer to the prisoner of war. The rate of payment to the State for overtime work will be assessed by the Commandant after consultation with the Agricultural Executive Committee, and will be not less than the local overtime rate for civilian labour. The employer will obtain receipts from the Commandant for payments as in (*a*) and from the prisoner of war as in (*b*). The Commandant will, during his visits of inspection, carry out the usual procedure as regards entering particulars on prisoners of war accounts, etc.

The rate of pay for a prisoner of war will be the third rate normally, *i.e.*, 1*d.* per hour. The second rate 1½*d.* per hour, will be reserved for those who have shown proficiency and industry, on the recommendation of the Agricultural Executive Committee. N.C.O.'s (who volunteer for such employment) will be given 2*d.* per hour. Prisoners of war will receive payment for overtime at the usual hourly rate of working pay.

(XIV.) Prisoners of war will be conveyed at Government expense to and from the railway station nearest the farm or holding. If necessary, the employer will convey, at his own expense, the prisoners of war from the railway station to the farm or holding and from the farm or holding to the place of labour, and *vice versa.* If a prisoner of war is returned to his camp or moved to a hospital, all reasonable expenses will be paid by the State.

(XV.) The arrangements made by any employer for the custody, accommodation, feeding and employment, will at any time be open to inquiry and inspection by the Military Authorities.

(XVI.) The terms of their employment should be carefully explained to prisoners of war by the Commandant, previous to their departure, and all rules as regards correspondence, restrictions, etc., impressed on them. They will be provided by the Commandant with (1) a German translation of all orders, (2) a pass, showing the man's number, name, corps, camp to which attached, and the name and address of his employer.

(XVII.) Commandants will arrange that letters, parcels, clothing, etc., are delivered to prisoners of war and will supply official notepaper,

(XVIII.) Complaints as to prisoners of war should be forwarded to the Commandant. The employer can under no circumstances inflict any form of punishment.

(XIX.) Employers will not be liable to pay compensation for injuries under the Workmen's Compensation Act. Any case of injury should, however, be reported, with full particulars, to the War Office, where it will be noted for any future action which may become necessary.

Notice to Employers of Prisoners of War Accommodated on Farms or Holdings.

1. Prisoners of war are not permitted to enter places of amusement, public houses, etc., or any houses or buildings other than those set apart for their accommodation or used in connection with their work.

2. Purchases prisoners of war may require to make will be made by the employer. A prisoner of war is not allowed to purchase foodstuffs through his employer, nor may he be permitted to purchase more than ½ oz. of tobacco or its equivalent in cigarettes weekly.

3. Prisoners of war will not be permitted to be away further than ½ mile from their place of residence, when not at work, and must not be out of doors later than one hour after sunset.

4. Prisoners of war will not be permitted to associate with anyone except those employed on the farm, or connected with the employment.

5. If there is no objection raised by the local authorities prisoners of war can attend British places of worship accompanied by the employer or responsible male British subject.

6. They are not permitted to make use of post, telegraph or telephone office, and are not permitted to forward or receive letters, etc., except through the Commandant.

7. Prisoners of war correspondence for posting will be forwarded to the Commandant by the employer, who will be supplied with stamped addressed envelopes for this purpose by the Commandant.

8. Prisoners of war are permitted to have such English newspapers as decided by the Commandant.

9. Prisoners of war will always be dressed in uniform or the prescribed dress.

10. No extra remuneration can be given prisoners of war by employers.

11. Prisoners of war so employed are not on parole; in case of escape or attempt to escape they will be dealt with by the Commandant in the usual manner.

THE following Memorandum (No. 21/C. 1), dated the 24th January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Cultivation of Celery. The Board have had under consideration the question as to whether it is desirable to impose any restrictions on the cultivation of celery. In their Bulletin, Series A, No. 1, issued in February, 1917, the Board expressed the opinion that restrictions were desirable where celery occupied land suitable for potatoes; and it would appear that the acreage cropped last year was in fact about 370 acres less than in 1916. The Board do not think that it is necessary this year to make any drastic reduction in the area devoted to celery, which only amounts to about 3,000 acres in England and Wales, but they have come to the conclusion that the acreage should be limited to approximately the amount grown last year.

A statement is attached (see below) showing the acreage returned under celery on the 4th June, 1917, in each county of England and Wales, by occupiers of over one acre of land, and it is suggested that Executive Committees should not allow any grower to cultivate a larger acreage than was grown by him in 1917.

ENCLOSURE.

Acreage under Celery, 1917.

ENGLAND.

	Acres.		*Acres.*
Bedfordshire	14	London	9
Berkshire	10	Middlesex	6
Buckinghamshire ..	3	Monmouth	2
Cambridge	164	Norfolk	365
Chester	60	Northampton ..	13
Cornwall	2	Northumberland ..	6
Cumberland	5	Nottingham	98
Derby	42	Oxford	6
Devon	10	Salop	10
Dorset	3	Soke of Peterboro' ..	1
Durham	18	Somerset	14
Essex	76	Stafford	6
Gloucester	51	Suffolk, East	22
Hampshire	32	,, West	23
Hertford	9	Surrey	42
Huntingdon	298	Sussex, East	9
Isle of Ely	465	,, West	14
Isle of Wight	1	Warwick	11
Kent	33	Wiltshire	3
Lancaster	362	Worcester	6
Leicester	24	York, E.R.	66
Lincoln (Holland) ..	294	,, N.R.	8
,, (Kesteven) ..	11	,, W.R.	131
,, (Lindsey) ..	268		

Total .. .. .. 3,126 acres.

None reported in Herefordshire, Rutland and Westmorland.

WALES.

	Acres.		Acres.
Carnarvon	2	Flint	2
Denbigh	2	Glamorgan	14
Total	20 acres.		

None reported in Anglesey, Brecon, Cardigan, Carmarthen, Merioneth, Montgomery, Pembroke or Radnor.

THE following Letter (No. 2/H), dated the 11th January, 1918, has been circulated by the Food Production Department of the Board:—

Potato Disease: Spraying Campaign.

SIR,—The Food Production Department is about to organise an extensive educational campaign to deal with the means to be employed in 1918 for reducing the loss of the potato crop from the disease, *Pyhtophthora infestans* or "Blight."

I herewith enclose various statements* received by the Department from private individuals and others who sprayed their crops last year. There is a very decided preponderance of favourable results. The comparatively few unfavourable Reports were mostly received from the North of England where acid fumes from factories in the neighbourhood of large towns, such as Batley and Sheffield, acted on the spraying solution in some way and caused scorching. The foliage was also severely attacked by Aphides in some districts.

Arrangements are being made for lectures, demonstrations and advice on spraying to be given free of charge to allotment holders, gardeners and potato growers.

This season the country will, as far as possible, be divided into areas of two, three or more counties, and the organiser concerned will work in close co-operation with the existing county authorities throughout each area.

The lectures will be made interesting by the use of lantern slides or coloured diagrams, and a special point will be made of inviting and answering questions at these meetings.

The Department will leave the sale and distribution of spraying machines and chemicals in the hands of the trade, but in view of the probable increased demand and the difficulties in transport the necessity of ordering without delay must be urged.

Representatives of the following manufacturers have met together and agreed to sell knapsack spraying machines for retail at 70*s*., subject to a possible increase in price in the near future:—

1. Messrs. W. T. French and Sons, Birmingham.
2. United Brassfounders, Limited, Birmingham.
3. Messrs. Benton and Stone, Birmingham.
4. Stonehouse Works Company, West Bromwich.
5. Four Oaks Company, Sutton Coldfield.

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* Not here printed, but the enclosures consisted of (1) a 23-page illustrated pamphlet, entitled "Potato Disease ('Blight') and its Prevention," containing a coloured diagram, and showing the extent of potato blight in this country from May to the end of last year (see also p. 1269 of this *Journal*); (2) a 44-page pamphlet, entitled "Extracts from Reports on Potato Spraying during 1917," comprising the Reports of 305 representatives of the Food Production Department on the results of spraying during 1917; and (3) a age leaflet, dated 11th November, 1917, containing Reports on Potato ease and Spraying at Military Camps —*Ed.*

6. Parkinson Stove Company, Stochford.
7. Mackie and Company, Reading.
8. Cooper, Pegler and Company, London.

The latter firm import the "Vermorel Eclair" machines; although in this case existing specifications cannot be changed the price will be 70*s*. less 15 per cent. to wholesale trade.

The potato crop will, in 1918, be of even more importance than in 1917, and every possible step must be taken to guard against disease. The Press has given the spraying section the most active and loyal help and support throughout 1917. The season was in many ways abnormal; delays were experienced in the delivery of machines and chemicals; spraying was often carried out too late, in a haphazard manner and with incorrectly made mixtures. Despite these facts the campaign was generally successful and will be conducted on a much larger scale this year. I therefore trust that I may rely upon your personal help and co-operation in bringing to the attention of the public the great importance of furthering in every possible way the better culture of the potato crop and of obtaining machines and chemicals well in advance of the spraying season.

The enclosed pamphlets will, I hope, provide you with data from which you may be willing to compile articles or notes or give answers to correspondents as space permits. Organisers and sub-organisers will be instructed to get personally into touch with the local Press, and I trust you will be kind enough to report on spraying meetings as occasion offers.

(Signed) ROBERT W. ASCROFT, Lieut.,
Officer in Charge of Spraying.

AN Order (No. 63), dated the 23rd January, 1918, has been made by the Food Controller to the effect that:—

The Potato Bags Order, 1918.

1. No bag which is or has been sold or supplied by or on behalf of the Food Controller for use as a potato bag shall be used for any purpose other than the carrying of potatoes, or sold or otherwise disposed of by any person at a price exceeding the sum of 6*d*.

2. A person shall not make any false statement in any application to the Food Controller for the sale or supply to him of any such bag.

3. In any proceedings it shall be presumed, unless the contrary be proved, that a bag marked "M.F." is a bag which has been sold or supplied by or on behalf of the Food Controller for use as a potato bag.

AN Order (No. 94), dated the 24th January, 1918, has been made by the Food Controller to the effect that:—

The Potatoes (Distribution) Order, 1918.

1. After the 3rd February, 1918, until further notice no person other than a person licensed by the Food Controller shall move or consign any potatoes from any place outside the area to which this Order for the time being shall be applied to any place within such area, and no person shall buy or agree to buy or take delivery of any potatoes to be moved or consigned to any place within such area except from a person so licensed.

2. Until further notice this Order shall apply to the area mentioned in the Schedule.

Note.—The areas in the Schedule include the counties of Brecknock, Cardigan, Carmarthen, Glamorgan, Monmouth, Pembroke and Radnor.

The Seed Potatoes (1917 Crop) Prices Order, 1918.

AN order (No. 138), dated the 4th February, 1918, has been made by the Food Controller in amendment of the Seed Potatoes (1917 Crop) Order, 1917,* to the effect that :—

1. In Clause 2 of the Principal Order, there shall be inserted after the definition of Class III. the following words :—"Class IV. shall mean potatoes of the varieties 'Myatt's Ashleaf Kidney,' 'Duke of York,' 'Sharpe's Express,' 'Eclipse,' 'British Queen,' 'Royal Kidney,' and 'King Edward' grown in England or Wales in the year 1917, other than potatoes belonging to Class III. which will pass through a riddle of 1⅞-in. mesh, and will not pass through a riddle of 1¼-in. mesh."

2. Clause 3 of the Principal Order shall be amended by the omission of the word "and" before the words "Class III." and the addition of the words "and Class IV." after the words "Class III."

3. The First Schedule of the Principal Order shall be amended by the addition of the following words at the end thereof :—

> "The highest authorised selling price per stone for potatoes of the varieties 'Sharpe's Express,' 'Eclipse,' 'Myatt's Ashleaf Kidney, and 'Duke of York' belonging to Class IV. shall be 2s. 6*d.*"

4. The Second Schedule of the Principal Order shall be amended by the addition of the following words: "No sum may be added under Clause 6 on the sale of any potatoes belonging to Class IV."

The Wheat (Seed) Order, 1918.

AN Order (No. 21), dated the 10th January, 1918, has been made by the Food Controller to the effect that :—

1. *Certain Wheat to be Used only for Seed.*—No person shall, until further notice, use for any purpose other than seed—

(*a*) in any part of the United Kingdom any wheat of the varieties "White Marvel," "Red Marvel," and "April Bearded" grown in the British Islands;

(*b*) in Ireland any wheat of the variety "Red Fife" grown in the British Islands.

2. *Restriction on Purchases.*—So long as the restriction imposed by Clause 1 is in force no person shall buy or otherwise acquire any wheat of the varieties mentioned unless either he being a person who ordinarily deals therein for seed purposes acquires them with a view to re-sale as seed or he requires them for the purpose of seed,

3. *Restriction on Sales.*—So long as the restriction imposed by Clause 1 is in force, no person shall sell or dispose of any wheat of the varieties mentioned except to a person who ordinarily deals therein for seed or to a person who is reasonably believed to require them for the purpose of seed.

4. "*Red Fife.*"—Clauses 2 and 3 of this Order shall not affect transactions in Great Britain relating to wheat of the variety "Red Fife."

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* See this *Journal*, December, 1917, p. 1014.

5. *Wheat Unfit for Seed.*—This Order shall not apply to any wheat of the varieties mentioned which shall be determined to be unfit for seed by any person authorised by the Food Controller, the Board of Agriculture and Fisheries, the Board of Agriculture for Scotland, or the Department of Agriculture and Technical Instruction for Ireland.

Wheat Needs of the Allies: How Canada Can Increase Supplies.

THERE appears to be some misunderstanding as to why wheat especially should be saved for export and why other cereals will not meet equally well the requirements of the Allied nations in Europe, says the Canadian *Food Bulletin*.

Three grains—wheat, rye, and barley—are peculiarly suited to making bread. They contain certain elements which can be kneaded when mixed with water. When yeast is added, they rise and maintain a continuity of structure. When the latter is baked, it forms a loaf which will keep and can be transported. None but these three grains will make bread as it is commonly known. In a recent address on the wheat needs of the world, Dr. Alonzo Taylor said :—

" As one follows each nation's development upward in an economic sense, one notes that they first eat barley. As it becomes more prosperous, barley is thrown to one side and rye is used ; and, finally, rye is cast aside and it subsists upon wheat. This has been the history of most Aryan peoples. The United Kingdom depends almost entirely upon wheat for its bread. Italy consumes wheat bread, but bread is not so prominent as elsewhere. Rye is universally used in Russia, and barley is still employed as a bread grain. The reason why wheat supersedes rye and barley is because the bread is whiter, of a finer texture, and has unquestionably a better taste. The flour has somewhat better keeping qualities, and wheat flour lends itself to the making of pastries and fancy articles as no other flour does.

" The women of France are absolutely dependent upon wheat bread, which forms 52 per cent. of the total food of the French people (the present ration is 18 oz. per day), a larger percentage than with any other nation of the world. They eat no rice, no corn ; they know nothing of oatmeal and rye, and of barley have little knowledge. The problem rises with France. If we were to estimate the wheat our Allies have raised, add to it the 200,000,000 bushels of exportable surplus wheat from Canada and the United States, and then send the balance of their need in other cereals, there would not be enough wheat flour to go around. You cannot make good bread if you have as low an amount as 60 per cent. of wheat flour with 40 per cent. of other cereals. From a practical point of view, bakers fail to make bread under these circumstances. You can get along on the proportion of 75 and 25. Unless we wish to impose upon the French women the burden of entirely recasting their households, it is up to us to get more wheat to the Allies, and especially to France."

It has been estimated that the Allies will need to import, on the basis of their pre-war consumption, about 577,000,000 bush. of wheat, or the equivalent of wheat flour. The urgent necessity of economising in the use of shipping obliges them to depend practically upon North America for their cereal supplies. And on the basis of normal consumption here, North America's exportable surplus will not greatly exceed 200,000,000 bush. of wheat. The aggregate wheat crop of the Western European Allies has been estimated at not more than 400,000,000 bush. Adding to this the North American exportable surplus of 200,000,000 bush., we have only 60 per cent. of the Allies' requirements, leaving 40 per cent. to be made up with other cereals. But as already has been explained, a good bread loaf cannot be made by the bakers of Europe with only 60 per cent. of wheat flour. If the people of North America, by reducing their consumption of wheat and substituting other cereals, will increase by 150,000,000 bush. the American continent's exportable surplus of wheat, the Allied countries of Western Europe will have enough wheat flour to hold mixed cereals together in a baker's loaf. (*Nat. Food Jour.*, 9th January, 1918.)

Amendment to the Grain (Prices) Order, 1917.*

BY an Order (No. 114), dated 31st January, 1918, made by the Food Controller, Clause 3 (*b*) of the Principal Order is repealed as on the 1st March, 1918, but without prejudice to any contract made before that date.

THE following Order (No. 113), dated the 31st January, 1918, has been made by the Food Controller :—

The Beans, Peas and Pulse (Retail Prices) Order, 1917: General Licence.

The Food Controller hereby authorises, until further notice, the sale and purchase specifically for seed purposes beans and peas, whether home grown or imported, at prices in excess of the prices permitted by the above Order, but subject to compliance with the povisions of the Testing of Seeds Order, 1917.

AN Order (No. 24), dated 8th January, 1918, has been made by the Food Controller to the effect that :—

The Milk (Registration of Dealers) Order, 1918.

PART I.—LICENSING OF WHOLESALE DEALERS IN MILK.

1. *Licensing of Wholesale Dealers.*—A person shall not deal in milk by wholesale either on his own account or for the account of any other person—

(*a*) after the 9th February, 1918, unless he has applied for a licence as a wholesale dealer in milk ; or

(*b*) after the 23rd February, 1918, unless he is the holder of a licence for the time being in force granted by the Food Controller authorising him to deal in milk by wholesale.

2. *Mode of Application for a Licence.*—Every application for a licence shall be made to the Secretary, Ministry of Food, Palace Chambers, Westminster, S. W. 1, on a form to be prescribed by the Food Controller, and every applicant shall furnish on such form a true statement of the particulars required for completing the form, which statement shall be signed by the applicant or his duly authorised agent.

3. *Issue and Revocation of Licences.*—A licence shall be granted under this Part of this Order to such persons and subject to such

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* The Principal Order appeared in the issue of this *Journal* for September, 1917, p. 673.

conditions as the Food Controller may determine, and any such licence may at any time be revoked by the Food Controller.

4. *Information and Inspection.*—The holder of any licence issued under this Part of this Order shall keep or cause to be kept at some convenient place accurate records as to his dealings in milk together with all relevant books, documents and accounts, and shall comply with any directions given by or under the authority of the Food Controller as to the form and contents of such records and shall permit any person authorised by the Food Controller or by a Food Committee to inspect all such records, books, documents and accounts. The holder shall also observe such directions as to his dealings in milk as may be given to him from time to time by or under the authority of the Food Controller and shall make such returns and furnish such particulars as to his dealings in milk as may from time to time be required.

5. *Production of Licence.*—Every licence issued under this Part of this Order shall be produced by the holder upon the demand of any person authorised by the Food Controller or by a Food Committee.

PART II.—REGISTRATION OF RETAIL DEALERS IN MILK.

6. *Registration of Retail Dealers.*—(*a*) A person shall not at any time after the 23rd February, 1918, deal in milk by retail, except in about or in connection with premises in respect of which he is the holder of a certificate of registration as a retail dealer in milk for the time being in force granted by the Food Committee for the area in which the premises are situate; but this shall not prevent a retail dealer duly registered from selling from his cart in the ordinary course of business in the area in which such premises are situate.

(*b*) The holder of any such certificate shall not after the 23rd February, 1918, deliver milk to a customer in any area other than that in which the premises mentioned in his certificate are situate unless he shall have deposited a copy of the certificate with the Food Committee for such other area.

7. *Form of Application for a Certificate of Registration.*—Every application for a certificate of registration shall be made on a form to be prescribed by the Food Controller, and every applicant shall furnish on such form a true statement of the particulars required for completing the same, which statement shall be signed by the applicant or by his duly authorised agent.

8. *Application to be Addressed to Food Committees for the Appropriate Area.*—Every application for a certificate of registration shall be made to the Food Committee for the area in which the premises of the applicant, in respect of which a certificate of registration is sought, are situate, and when the same person is applying for registration in respect of premises situated in more than one area, separate application shall be made in each area in respect of the premises situated therein.

9. *Persons Entitled to Receive a Certificate of Registration.*—A person who, or whose predecessor in business, was, at the date of this Order carrying on business as a retail dealer in milk, shall, on making application before the 9th February, 1918, be entitled to receive a certificate of registration in respect of the premises in about or in connection with which such business was being carried on.

10. *Grounds for Refusing a Certificate of Registration.*—A Food Committee shall not refuse a certificate of registration duly applied for by a person entitled to receive the same under the preceding Clause

of this Order except with the consent of the Food Controller and in circumstances in which the Food Committee might have revoked the certificate if it had already been granted. Upon the refusal of a certificate the applicant's title (if any) shall cease.

11. *Power to Food Committees to Grant New Certificates.*—A Food Committee may, in any case in which in their opinion it is desirable to do so in the interests of the public within their area, with the consent of the Food Controller, grant to any other person a certificate of registration as a retail dealer in milk in respect of any premises within their area; and unless they shall see any good reason to the contrary, they shall, without any such consent, grant a certificate of registration to every applicant who has served during the present war in the forces of the Crown, and who before so serving was carrying on a business as a retail dealer in milk within the area of the Committee.

12. *Form of Certificate.*—Every certificate of registration shall be in the form prescribed by the Food Controller and shall be granted and held subject to such conditions as the Food Controller may determine.

13. *Revocation of Certificates.*—A Food Committee may with the consent of the Food Controller revoke any certificate of registration issued by them under the provisions of this Part of this Order if they are satisfied that any of the provisions of this Order or any regulation or direction made or given by or under the authority of the Food Controller relating to the trade or business of the holder of such certificate has not been observed by him or by any of his servants or agents; and shall revoke such certificates if required so to do by the Food Controller.

14. *Register of Holders of Certificates.*—A Food Committee shall keep in a form prescribed by the Food Controller a register of the persons to whom and the premises in respect of which certificates of registration have been granted under this Part of this Order.

15. *Transfer of a Business.*—In the event of the transfer of the business in connection with which a certificate of registration is held, or in the event of the death of the holder of a certificate of registration, it shall be lawful for the transferee or other person claiming under the holder of such certificate, on making an application for a certificate of registration to deal in milk by retail from the date of such application until the decision thereon is intimated by the Food Committee, in the same manner and subject to the same conditions as the holder of such certificate was entitled by virtue thereof.

16. *Inspection and Information.*—The holder of a certificate of registration shall keep or cause to be kept at the premises in respect of which he is registered accurate records as to milk dealt in and such other matters as the Food Controller may from time to time prescribe, together with all relevant books, documents and accounts, and shall comply with any directions given by or under the authority of the Food Controller as to the form and contents of such records, and shall permit any person authorised by the Food Controller or a Food Committee to inspect his premises and the records to be kept under this Clause and all relevant books, documents and accounts. The holder shall also observe such directions as to his dealings in milk as may be given to him from time to time by the Food Controller or the Food Committee, and shall make such returns and furnish such particulars relating thereto as the Food Controller or the Committee may from time to time require.

17. *Custody and Production of Certificates.*—Every certificate of registration shall be kept at the premises or some one of the premises to which it relates; and every holder of a certificate of registration shall produce the same for inspection upon the demand of any person authorised by the Food Controller or a Food Committee.

PART III.—GENERAL.

18. *Exceptions.*—Nothing in this Order shall affect—

(*a*) dealings in condensed milk, dried milk, or other milk preparation;
(*b*) sales of milk for consumption on the premises of the seller;
(*c*) a wholesale sale of milk by the producer of the milk sold;
(*d*) a sale of milk to his own employees or servants by the producer of the milk sold.

19. *Interpretation.*—For the purposes of this Order—

"Food Committee" shall mean a Food Control Committee established in pursuance of the Food Control Committees (Constitution) Order, 1917.

A sale of 17 imperial gal. or more to be delivered at any one time shall be deemed to be a dealing in milk by wholesale; and any other sale shall be deemed to be a dealing in milk by retail.

NOTE.—This Order extends only to Great Britain.

THE following Notice has been issued by the Food Production Department of the Board:—

The Milk Supply: Arable *v.* Pasture Land. Important Statement by Mr. Prothero.

Certain critics of the policy of the plough have suggested that if we increase the area of arable land we shall necessarily decrease the production of milk in this country. A number of farmers seem to share the delusion and have raised the point at various meetings in different parts of the country. Recently the President of the Board of Agriculture, Mr. R. E. Prothero, visited Aylesbury to address the Buckinghamshire agriculturists, and out of this visit has arisen an interesting exchange of letters between Mr. Prothero and Mr. H. N. Lear, of Brill House, Brill.

Mr. Lear wrote the President of the Board of Agriculture expressing the anxiety of the Buckinghamshire farmers "to know how far, if at all, more importance is placed upon the production of corn than upon that of milk and meat?" In South Buckinghamshire he pointed out, milk was the most important consideration of the farmer, who sends this form of produce in large quantities to London or Aylesbury. "Assuming that these farmers have their farms fully stocked with dairy cows and store cattle," said Mr. Lear, "they would like to know if they are required to break up pasture with a view to growing more corn? In their opinion such a course would tend to a reduction in the supply of milk and that at a time when they are being urged to maintain if not to increase the quantity."

Mr. Prothero's Statement.—In his reply, Mr. Prothero says:—

"The nation needs corn. That is true. But the nation also needs both meat and milk. How can we grow more corn without going short in the two other wants? That is your question, and my answer is this:

You can only hope to meet all three needs by adding to the land under the plough. In the short time we have, there is no other way in which you can keep up the supply of meat and milk and increase that of corn.

Remember three points. You know them better than I do. The first point is this: It is out of a total of 18 million acres of grass that you are asked to plough up 2 millions. You still have 16 million acres of grass left. You lose one-ninth of the whole; you keep eight-ninths. The loss is not so great that you could not, but for the War, meet it by better management of the grass that you keep. To-day your grass is often scraped and rarely fed. In ordinary times, slag and drainage might help to replace the loss of area. But fertilisers are scarce, and you probably cannot spare the labour, or get the pipes for drainage. Arable land alone can give the increased yield of animal food which is hard to get by improving the grass. It is only the plough which can make good the loss.

This brings me to the second point. More milk and meat can be produced on arable land than can be produced on grass, and the more arable land you have under the plough the more cattle you need to tread the straw and make manure. The anxiety and risk are greater, but we are not talking about these. Arable land can make good the loss of grass. There is another loss that arable land *must* make good, if we are to have any winter milk or winter meat.

So I reach the third point. It is this: When we speak of milk and meat being produced off grass, we do not really mean what we appear to say. Looking at the whole life of milch cows or of cattle for slaughter, they owe to grass only about one half of the growth of their meat weight or milk yield. The other half they owe to the produce of arable land and to cake or other imported food. During the coming year, and probably for some time ahead, you will hardly be able to get more concentrated foods—cake, corn, millers' offals, and brewers' grains—than will afford a smaller ration than usual to working horses and cows in milk, and possibly to lambing ewes and weaned calves. The food will be short in quantity and poor in quality. There will be nothing left for fatting sheep, cattle or pigs. If you stick only to your grass, how will you supply winter milk and winter meat? You can only give us summer milk and summer-fattened cattle. Hay will maintain life, but nothing more. Something else is needed to produce milk or make weight. Even on straw and roots, it is only the older beasts that will fatten. And where, now, are those older beasts?

This is the trouble you have to face. Ploughing up grass is a sacrifice to landlords and a risk to tenants. It is not pleasant to either. It is, most of all, unpleasant to those farmers who have in the past trusted entirely to grazing. But they have not, perhaps, fully realised the consequences of the great shortage of concentrated foods. Those consequences seem to force grass farmers to plough up part of their land, and to drive them to devote the necessary portion of corn, and the rest of fodder crops. Vetch hay, for instance, and vetch silage, if cut at an early stage in the formation of pod, provide winter food on which cows will yield milk, and cattle, even young stock, can be brought forward at a reasonable state of fatness. On such a diet they will not be prime meat, but they will make meat that is fair and eatable.

The War has brought on us very difficult times. The leaflet which I send you suggests a course of cropping, which may help grass farmers both to grow corn and keep up their cattle. If they plough some of their land for corn, and the rest for vetches or other suggested crops, they will have a winter food on which cows will give milk and cattle increase in weight."

THE following paragraphs are taken from a letter which the President of the Board of Agriculture addressed to a correspondent on the 9th January, 1918 :—

Ploughing of Grass on Dairy Farms.

* * * *

"Why sell your cows because 15 acres of your land is to be ploughed up ? Could you not grow more green catch crops which could be soiled or made into silage, and thus replace its grazing value and the hay ? I quite agree that a certain amount of grass is necessary for grazing, hay, and, above all, for giving cows exercise. But at present a very large amount of land used for these purposes is not used to the best advantage from the point of view of the nation's larder in a time of national emergency.

The fact that your tenant at Leeds buys practically everything for his cows is in itself a conclusive argument that the sooner he becomes to some degree self-supporting the better. The fact that many cow-keepers are at the moment in the same position is one of the great difficulties in connection with milk production, especially as it is estimated that the whole supply of concentrated animal foods will barely suffice to meet the requirements of cows in milk and horses in work. And the seriousness of the position will not be co-terminous with the War, but will undoubtedly continue for several years. The extent to which some cow-keepers are dependent on outside sources for their foodstuffs is even more remarkable and deplorable than the case of our street-bred and semi-urban population.

Again, roughly speaking, the production of food can be increased as much as four-fold by breaking up suitable grass. An acre of grass will produce 120 gal. of milk in a year, which means 1,200 lb. of human food. But the same acre will produce, if ploughed up and used for potatoes, at 5 tons to the acre, 11,200 lb. of human food ; and, weight for weight, the potato is as good as milk.

In ordinary times I should hesitate to agree to much that, owing to long years of neglect of our agricultural policy, is now vital to the nation's well-being, or, I might even say, its very existence. But the above facts are irrefutable in times when the shortening of the belt is no longer a matter of choice.

According to calculations of the Wheat Commission, even if we pull through till after next year's harvest, the position will show little improvement. There is a world shortage, a great demand, and the shipping position is one which personally causes me the gravest concern. Briefly, we are up against it ; and I feel sure you will see the necessity of standing your share of the racket. There is, of course, the Defence of the Realm (Losses) Commission, in cases where a landlord or tenant has suffered material and substantial loss of income. What their view would be in grass land cases I cannot, of course, say ; but you should keep a record of the condition of your grass before it is broken up, in case you wish to make a claim.

I can only say that if this country goes short of food, the position of owners of grass land in a borough like Leeds would not, in my opinion, be an enviable one."

Combination in Milk Production.

THE shortage of milk throughout the country is leading to many fresh developments in the milk industry. The general tendency is towards combination. The Food Committee of Woking have made an arrangement with the trade, under which the area has been mapped out into districts allotted to the different dairymen, each dairyman having the exclusive right to deliver in one district. The public retain the right to purchase milk over the counter from any retail milk depot, but they can only be served at their own houses by the dairyman to whom their district has been allotted.

The Public Health Committee of the City of Norwich have for some time been engaged in devising a municipal scheme of milk supply. In the opinion of the Committee the ideal scheme is that the Corporation, or their agents, should acquire the necessary milk supply for the City direct from the producers, and that the distribution should be carried out by licensed retailers in prescribed areas and subject to regulations securing the purity and cleanliness of the milk. This scheme though not immediately practicable in its entirety should, the Committee consider, be kept in view as the ultimate aim in any action now taken. The Public Health Committee have recommended that they should be constituted a Sub-Committee of the Local Food Control Committee to carry out the scheme, and that applications be made to the Ministry of Food for power to take action. The immediate proposal before the Committee is that the City should be divided into 94 districts, each containing about 300 houses and 1,100 persons, institutions, such as hospitals, hotels, etc., which have separate contracts being for the present excluded. One retailer will be given exclusive right of supply in a particular district, and all retailers will be licensed subject to the consent of the Food Controller.—(*National Food Journal*, 9th January, 1918).

Cattle Feeding Stuffs (Priority Supply) Order, 1918.

AN Order (No. 7), dated the 4th January, 1918, has been made by the Food Controller to the effect that:—

1. *Priority Certificates.*—The Food Controller or any person authorised by him may grant to any owner of dairy cattle in milk, or such other cattle as the Food Controller may from time to time determine, a priority certificate entitling such owner to a priority supply of cattle feeding stuffs of such quantities and such varieties and during such periods as may be stated in the certificate. The Food Controller may revoke any certificate so granted.

2. *Priority Supplies.*—A person shall in the disposition of any cattle feeding stuff give preference to a person seeking to obtain the same under a priority certificate issued under this Order, and shall not dispose of any cattle feeding stuff until all orders for the like cattle feeding stuff properly demanded under any priority certificate have been fulfilled by him.

3. *Endorsement of Certificate.*—On the occasion of a sale of any cattle feeding stuffs under a priority certificate, the seller shall correctly enter or endorse on the certificate in a durable form the quantity and variety of feeding stuffs sold and the date of sale.

4. *Application for Certificate.*—Every application for a priority certificate shall be made in such manner or on such form as may be prescribed by or under the authority of the Food Controller.

5. *False Statements, etc.*—A person shall not—

(*a*) Make or connive at the making of any false statement with a view to obtaining a priority certificate for himself or any other person ; or

(*b*) Make or connive at the making of any false entry or endorsement on a priority certificate ; or

(*c*) Fail or neglect, or connive at any failure or neglect, to make any entry or endorsement on, or to complete any priority certificate in manner directed thereon or required by this Order ; or

(*d*) Assign or attempt to assign any priority certificate or any cattle feeding stuff obtained thereunder ; or

(*e*) Falsely represent himself to be a person to whom any such certificate applies or has been issued.

6. *Duty of Owner of Certificate.*—No person having obtained cattle feeding stuff under a priority certificate shall use any part of such feeding stuff for any purpose other than feeding the dairy or other cattle in respect of which the certificate was granted.

7. *Interpretation.*—For the purpose of this Order—

"Cattle Feeding Stuffs" includes cattle feeding cake and cattle feeding meal of every variety millers' offals, barley offals, oat offals, malt culms, kiln dust, brewers' grains, distillers' grains, and maize by-products, but does not include any of such products which are suitable for human food.

An important step towards securing the continued production of milk and other dairy produce has been taken by the issue of the above Order. This gives priority to dairy herds over other cattle in the supply of the limited quantities of feeding stuffs. Farmers and cowkeepers apply in the first instance to the Live Stock Commissioner for the area, who will issue licences to buy in priority from any licensed dealer after allowing for any stocks the applicant may have in hand. All dealers are licensed in any area by the Provincial Feeding Stuffs Committees, now fully established, and they are required to supply orders covered by priority certificates before meeting other orders.

AN Order (No. 58), dated the 21st January, 1918, has been made by the Food Controller to the effect that :—

The Cattle Feeding Stuffs (Requisition) Order, 1918.

1. *Existing Stocks.*—(*a*) In pursuance of Regulation 2B of the Defence of the Realm Regulations, the Food Controller gives notice that he hereby takes possession of all cattle feeding stuffs which are in the United Kingdom on the 22nd January, 1918, and are not already in his possession under or by reason of any previous Order.

(*b*) This Clause shall not apply to cattle feeding stuffs in the hands of a person who at the close of business on the 21st January, 1918, does not hold more than 50 tons of cattle feeding stuffs, or in the hands of a person intending to use the same solely for the feeding of cattle or other animals owned by him.

2. *Future Imports.*—(*a*) In pursuance of Regulation 2F of the Defence of the Realm Regulations, the Food Controller requires all persons owning or having power to sell or dispose of any cattle feeding stuffs which may arrive in the United Kingdom after the 21st January, 1918, to place the same at the disposal of the Food Controller and deliver the same to him or to his order.

(*b*) Any arbitrator to act for the purposes of this Clause shall be appointed by the Lord High Chancellor of Great Britain.

3. *Manufactured Compound Cakes.*—(*a*) In pursuance of Regulation 7 of the Defence of the Realm Regulations, the Food Controller hereby orders that the occupier of every factory or workshop in which any cattle feeding stuffs are manufactured, produced or adapted for sale, shall place at the disposal of the Food Controller the whole of the cattle feeding stuffs which shall be made, produced or adapted for sale by him after the 21st January, 1918, and shall deliver the same to the Food Controller or to his Order.

(*b*) This Clause shall not apply to any oil cakes or meals to which the Oils, Oil Cakes and Meals (Requisition) Order, 1917, applies.

4. *Returns.*—(*a*) Every person holding any cattle feeding stuffs to which Clause 1 of this Order applies, shall on or before the 31st January, 1918, furnish to the Secretary, Ministry of Food, Palace Chambers, London, S.W. 1, a return showing—

(i) The amounts and varieties of the cattle feeding stuffs held by or in transit to him at the close of business on the 21st January, 1918, and
(ii) The quantity sold and unsold in each case.

(*b*) Every person to whom Clause 2 of the Order applies, shall on or before the 31st January, 1918, furnish to the Secretary, Ministry of Food, Palace Chambers, London, S.W. 1, a return showing—

(i) The amounts and varieties of the cattle feeding stuffs afloat and shipped to the United Kingdom to him or to his order on the 21st January, 1918;
(ii) The amounts and varieties of cattle feeding stuffs purchased for shipment to him or to his order, and not shipped on the 21st January, 1918; and
(iii) The quantity sold and unsold in each case.

5. *Interpretation.*—For the purposes of this Order—

"Cattle Feeding Stuffs" includes cattle feeding cake and cattle feeding meal of every variety, millers' offals, barley offals, oat offals, malt culms, kiln dust, brewers' grains, and distillers' grains, but does not include any of such product which are suitable for human food.

6. *Exception.*—This Order shall not apply to a flour miller in relation to millers' offals produced or to be produced at his mill, if such mill is a mill to which the Flour Mills Order, 1917, or the Flour Mills Order, No. 2, 1917, applies.

AN Order (No. 102), dated 29th January, 1918, has been made by the Food Controller to the effect that :—

Cattle Feeding Stuffs (Licensing) Order, 1918.

1. *Importers and Makers to be Licensed.*—A person shall not sell by wholesale cattle feeding stuffs imported or made or produced by him—

(*a*) After the 9th February, 1918, unless he has applied for a license authorising him to sell cattle feeding stuffs by wholesale as a first-hand seller ; or

(*b*) After the 23rd February, 1918, unless he is the holder of a license, for the time being in force, granted by or under the authority of the Food Controller, authorising him to sell cattle feeding stuffs by wholesale as a first-hand seller.

2. *Wholesale Dealers to be Licensed.*—A person shall not sell by wholesale cattle feeding stuffs not imported or made or produced by him—

(*a*) After the 9th February, 1918, unless he has applied for a license authorising him to sell cattle feeding stuffs by wholesale as a wholesale dealer ; or

(*b*) After the 23rd February, 1918, unless he is the holder of a license, for the time being in force, granted by or under the authority of the Food Controller, authorising him to sell cattle feeding stuffs by wholesale as a wholesale dealer.

3. *Distributing Dealers to be Licensed.*—A person shall not sell cattle feeding stuffs as a distributing dealer for consumption or delivery within the area of any Provincial Committee as set out in the Second Schedule* to this Order :—

(*a*) After the 9th February, 1918, unless he has applied for a license authorising him to sell cattle feeding stuffs as a distributing dealer in that area ; or

(*b*) After the 23rd February, 1918, unless he is the holder of a license for the time being in force, granted by or under the authority of the Food Controller, authorising him to sell cattle feeding stuffs as a distributing dealer in that area.

4. *Application for Licenses*—(*a*) Applications for a license under this Order as a first-hand seller may be made by an importer or maker, and applications for a license under this Order as a wholesale dealer may be made by any person desiring to be licensed as a wholesale dealer. All such applications shall, except in the case of flour millers, be made to the Port Committee within whose division, as set out in the First Schedule* to this Order, the applicant's principal or only trade premises are situate, or to such other person as the Food Controller may prescribe, and shall in the case of flour millers be made in such manner as the Food Controller may direct.

(*b*) Applications for a license under this Order as a distributing dealer may be made by any person desiring to be licensed as a distributing dealer. All such applications shall, except in the case of flour millers, be made to the Provincial Committee within whose area the applicant desires to sell cattle feeding stuffs for consumption or delivery, or to such other person as the Food Controller may prescribe, and shall in the case of Flour Millers be made in such manner as the Food Controller may direct.

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* The First and Second Schedules referred to in this Order were printed with the Cattle Feeding Stuffs (Committees) Order, 1917, published in the issue of this *Journal* for January, 1918, (pp. 1142–1146), and are not therefore reprinted here.

Where any person, other than a flour miller, desires to sell cattle feeding stuffs as a distributing dealer for consumption or delivery within the area of more than one Provincial Committee, a separate application for a license shall be made in respect of each such area.

(*c*) A person who desires to deal in cattle feeding stuffs in more than one capacity may make application for a license in each of such capacities.

5. *Form of Application.*—Every application for a license shall be made on a form prescribed by the Food Controller, and every applicant shall furnish upon such form a true statement of the particulars required for completing the form. Such statement shall be signed by the applicant or his duly authorised agent.

6. *Issue of Licenses.*—(*a*) A Port Committee shall, unless otherwise directed by the Food Controller, on receipt of an application for a first-hand seller's license or a wholesale dealer's license made in accordance with this Order from a person, who or whose predecessor in business was on 1st January, 1917, and who at the date of the application, is carrying on a regular business in cattle feeding stuffs of such a kind as would, had this Order been then in force, have required him to hold a license to sell by wholesale as a first-hand seller, or as a wholesale dealer, issue to such person a license as a first-hand seller or as a wholesale dealer, as the case may be, and shall also issue a first-hand seller's license or a wholesale dealer's license to such other persons as the Food Controller may from time to time direct.

(*b*) A Provincial Committee shall, unless otherwise directed by the Food Controller, on receipt of an application for a distributing dealer's license made in accordance with this Order from a person, who or whose predecessor in business was on the 1st January, 1917, and who at the date of the application is carrying on a regular business in cattle feeding stuffs for consumption or delivery within the area of the Committee, of such a kind as would, had this Order been then in force, have required him to hold a license to sell as a distributing dealer, issue to such person a license to sell cattle feeding stuffs as a distributing dealer in the area of the Committee, and shall also issue a distributing dealer's license to such other persons as the Food Controller may from time to time direct.

(*c*) Where any applicant is refused any license, such refusal and the grounds therefor shall forthwith be reported to the Food Controller.

7. *Revocation of Licenses.*—Any license issued under this Order may be made subject to such conditions as the Food Controller may determine, and may at any time be revoked by the Food Controller or with the sanction of the Food Controller by the Committee who granted the same.

8. *Duties of Licensee.*—The holder of a license shall keep or cause to be kept at some convenient place accurate records relating to his trade or business in cattle feeding stuffs showing the descriptions and quantities sold, the prices paid or payable, the transport charges (if any), and such other information as the Food Controller may from time to time specify, together with all relevant forms, documents, invoices and accounts, and shall comply with any directions given by or under the

authority of the Food Controller as to the form and contents of such records. The holder shall also observe such directions as to his trade or business in cattle feeding stuffs as may be given to him from time to time by or under the authority of the Food Controller, and shall make such returns and furnish such particulars as to such trade or business as may from time to time be required by the Food Controller, and shall permit any person authorised by the Food Controller to inspect all relevant books, documents and accounts relating thereto.

9. *Production of Licenses.*—Any license granted under this Order shall be produced by the holder on demand of any person authorised by the Food Controller or the Committee by whom the license was issued.

10. *Transfer of Business.*—In the event of the transfer of any business in connection with which a license is held by any licensee, or in the event of the death of a licensee, it shall be lawful for the transferee or other person claiming under the licensee, on making application for a license of the same description as the license held by such licensee, to sell cattle feeding stuffs, from the date of such application until receipt of intimation from the Committee to whom the application is made or from the Food Controller whether or not the license applied for will be granted, in the same manner and subject to the same conditions as the licensee was entitled to sell the same by virtue of the license held by him.

11. *Committees to Act under Direction of Food Controller.*—Every Port Committee and every Provincial Committee shall, in the exercise of the powers and performance of the duties conferred or imposed upon them by this Order, comply with such directions as may from time to time be given to them by the Food Controller.

12. *False Statements.*—A person shall not—

(*a*) Knowingly make or connive at the making of any false statement in any application or return made in connection with or for any of the purposes of this Order ; or

(*b*) Forge or alter any license or other document issued under or for any of the purposes of this Order ; or

(*c*) Personate or falsely represent himself to be a person to whom a license has been issued or applies.

13. *Definitions.*—In this Order, and in any license granted under this Order,

"Cattle Feeding Stuffs" means cattle feeding cake and cattle feeding meal of every variety, millers' offals, barley offals, oat offals, malt culms, kiln dust, brewers' grains, and distillers' grains, but does not include any of such feeding stuffs as are suitable for and sold as human food.

"Maker" means and includes any seed crusher, compound cake maker, miller, brewer, distiller, or other person manufacturing or producing cattle feeding stuffs.

"To sell by wholesale as a first-hand seller" means to sell cattle feeding stuffs imported, produced or made by the person in question, otherwise than to (*a*) a person buying for the purpose of feeding his own animals, or (*b*) a person entitled to sell cattle feeding stuffs without a license.

"To sell by wholesale as a wholesale dealer" means to sell cattle feeding stuffs bought from an importer or maker by the person in question, otherwise than to (*a*) a person buying for the purpose of feeding his own animals, or (*b*) a person entitled to sell cattle feeding stuffs without a license.

"To sell as a distributing dealer" means to sell cattle feeding stuffs otherwise than as is mentioned in the two preceding paragraphs of this Clause.

"Port Committee" and "Provincial Committee" mean a Port Feeding Stuffs Committee and a Provincial Feeding Stuffs Committee constituted by the Cattle Feeding Stuffs (Committees) Order, 1917.

14. *Exemption of Small Businesses.*—Nothing in this Order shall apply to—

(*a*) A sale of cattle feeding stuffs by any person if the total of the amount sold on the occasion of such sale and of the amounts of cattle feeding stuffs previously sold by such person during the calendar year in which the sale takes place is not more than 50 tons; or

(*b*) A sale by a person, licensed in that behalf by the Royal Commission on Wheat Supplies, of cattle feeding stuffs imported by the Commission or made or produced solely from any articles imported by the Commission.

Note.—This Order shall not apply to a person who sells in Ireland cattle feeding stuffs for delivery in Ireland.

AN Order (No. 29), dated the 12th January, 1918, has been made by the Food Controller to the effect that:—

The Edible Offals (Maximum Prices) Order, 1918.

1. *Maximum Prices.*—A person shall not, after the 21st January, 1918, sell or offer or expose for sale or buy or offer to buy any offals of the descriptions set out in the Schedule to this Order at prices exceeding the maximum prices applicable thereto, according to the provisions of this Order.

2. *Maximum Prices for Home-killed Offals*—The maximum prices per lb. for home killed offals shall be as follows:—

(*a*) On the occasion of any sale by wholesale the prices set out in the first column of the first Schedule;

(*b*) On the occasion of any sale by retail the prices set out in the second column of the first Schedule.

3. *Maximum Prices for Imported Offals.*—The maximum prices per lb. for imported offals shall be as follows:—

(*a*) On the occasion of any sale by wholesale the prices set out in the first column of the second Schedule;

(*b*) On the occasion of any sale by retail the prices set out in the second column of the second Schedule.

4. *Basis of Wholesale Prices.*—(*a*) The maximum prices on the occasion of any wholesale sale of offals are fixed on the basis that the offals are delivered on the occasion of a sale of home-killed offals by the slaughterer, *ex* slaughterhouse, and on the occasion of any other sale, *ex* warehouse or store at the seller's customary place of sale and that packages are in either case provided by the seller.

(*b*) If the offals are sold on terms other than those mentioned in the foregoing Sub-clause of this Clause a corresponding variation shall be made in the maximum price.

5. *Packages, etc.*—On the occasion of a retail sale of offals no additional charge may be made for packages or for giving credit or for making delivery.

6. *Home-killed Offals Sold in Sets.*—Where home-killed offals are sold in sets the total price shall not exceed the maximum price which would have been payable if each item had been bought and paid for separately.

7. *Weighing of Home-killed Offals.*—For the purpose of fixing the price of home-killed offals the weight of the offals shall be taken to be their weight after they have set.

8. *Fictitious Transactions.*—A person shall not upon the occasion of any sale of offals to which this Order applies enter or offer to enter into any artificial or fictitious transaction or make or demand any unreasonable charge.

9. *Contracts.*—Where any contract subsisting on the 21st January, 1918, for the sale of any offals provides for the payment of a price in excess of the permitted maximum price, the contract shall stand so far as concerns offals delivered before the 21st January, 1918, but shall be avoided so far as concerns offals agreed to be sold above the permitted maximum price which has not been so delivered.

10. *Powers of Food Committee in Relation to Prices for Offals.*—On and after the 21st January, 1918, a Food Committee shall not exercise in relation to offals the power conferred by Clause 7 of the Meat (Maximum Prices) Order, 1917, except with the consent of the Food Controller, and except in such cases as the Food Controller may otherwise determine any maximum prices theretofore prescribed for offals under such powers shall cease to be in force, but without prejudice to any proceedings in respect of any previous contravention thereof.

11. *Exceptions.*—This Order shall not apply to a sale of cooked offals for consumption on the premises of the seller.

12. *Interpretation.*—For the purposes of this Order "home-killed offals" shall mean such offals as have been obtained from beasts slaughtered in the British Islands. "Imported offals" shall mean all other offals.

"Food Committee" shall mean as regards Great Britain a Food Control Committee established in pursuance of the Food Control Committees (Constitution) Order, 1917, and as regards Ireland the Food Committee appointed for Ireland by the Food Controller.

FIRST SCHEDULE.

MAXIMUM PRICES FOR EDIBLE OFFAL FROM HOME-KILLED STOCK.

	Maximum Wholesale Prices per lb.	*Maximum Retail Prices per lb.*
Cattle Offal.	*s. d.*	*s. d.*
Head (*ex* tongue) ..	0 3	0 4
Tongue (fresh or pickled)	0 11	1 1
Heart (whole)	0 9	0 11
„ cuts of	—	1 2
Liver (whole)	0 10	1 0
„ cuts of	—	1 2

	Maximum Wholesale Prices per lb. s. d.	*Maxium Retail Prices per lb.* s. d.
Cattle Offal—cont.		
Lights and melt	0 2	—
,, (not sold by weight)	—	1 6 per set.
Melt	—	0 4
Tripe, reed and roll ..	0 2	—
Feet	0 2	0 4 scalded.
Tail	1 2	1 4
Heart and throat bread..	1 0	1 4
Gut breads	0 4	0 6
Skirt and kidney ..	1 1	1 4
Cheek, with bone ..	0 8	1 0
,, boneless	0 10	1 2
Brains	0 5	0 6
Sheep Offal.		
Heads (*ex* horns) and plucks together ..	0 6	—
Head without horns ..	0 3	0 4
Tongues	—	1 0
Brains	—	1 0
Pluck	0 9	—
Kidneys	2 6	3 0
Sweetbreads	2 0	2 6
Trotters	0 10 per score.	—
Heart	—	1 4
Liver	1 2	1 6
Lights	—	0 4 per set.
Top (plucks *ex* liver) ..	0 4	—
Calves Offal.		
Head (9*d.* each extra if scalded)	0 7	—
Head (scalded)	—	0 10
Pluck	0 10	—
Sweetbreads	4 0	5 0
Feet (1*d.* extra if scalded)	0 3	0 5 if scalded.
Heart	—	1 2
Liver	1 6	1 9
Lights (not sold by weight)	—	0 6 per set.
Top (plucks *ex* liver) ..	0 3½	—
Pigs Offal.		
Plucks or plucks and fats	0 8	0 10
Inwards or chitterling ..	0 5	—
,, (not sold by weight)	—	1 0 each.
Liver and fats	1 0	1 4
Heart	—	1 2
Lights (not sold by weight)	—	0 4 per set.
Top (plucks *ex* liver) ..	0 2½	—

Provided that in the case of pigs offal the wholesale maximum price of offal obtained from any carcase shall not exceed 6*d.* per stone of the weight of the dressed carcase.

SECOND SCHEDULE.

MAXIMUM PRICES FOR IMPORTED OFFAL.

	Maximum Wholesale Prices per lb.		*Maximum Retail Prices per lb.*	
Cattle Offal.	*s.*	*d.*	*s.*	*d.*
Livers	0	10	1	0
Cuts of liver	—		1	2
Tongues	0	11	1	1
Tails	0	10	1	0
Hearts	0	9	0	11
„ cuts of	—		1	1
Kidneys	0	11½	1	2
Brains	0	4	0	6
Cheeks	0	9½	1	0
Tripe (prepared)	0	10	1	0
„ cuts of	—		1	1
Thick skirts	1	1	1	3
Thin „	0	11	1	1
Shin beef	1	1	1	3
Caul fat	1	1	1	3
Kidney knobs	1	3½	1	6
Sweetbreads	1	3	1	6
Beef marrow	1	0	1	3
Boneless beef	1	1	1	3
Tender loins (fillets)	1	6	1	8
Calves tongues	1	0	1	2
Mutton Offal.				
Kidneys	1	9 per doz.	2	6 per doz.
Tongue, lamb or sheep	0	10½	1	0½
Sweetbreads	1	3	1	6
Plucks	1	6 each.	1	10 each.
Hearts, sheep	3	9 per doz.	4	6 per doz.
„ lamb	3	3	4	0

Fodder Shortage and the Farmer's Task.

IT has been decided by the Board of Agriculture and the Ministry of Food, acting in co-operation, that it is desirable in the present serious emergency to enable farmers to learn the exact facts of the situation with regard to the supply and the provision of food. There is abundant evidence from all parts of the country that where farmers have knowledge of what is required in the interests of the country exceptional efforts have been and are being made to increase the production of foodstuffs, and that there is eagerness to discover by what means this end may be achieved.

One of the most important difficulties that the agriculturist has to face at the moment is the deficiency of concentrated feeding stuffs, particularly of cake. Farmers find that they are driven by circumstances to modify their normal practice and to abandon methods the excellence of which has been proved by the experience of a lifetime. In these circumstances it is desirable and even essential that full information should be provided of alternative methods of feeding stock, and that the experience of one farmer who has worked out a satisfactory method of feeding under war conditions should be placed at the disposition of others with whom he is not in immediate touch. Another problem, the solution of which is taxing the resources of the farmers is the provision of the necessary fertilisers if the large crops which are required to meet the national needs are to be produced.

Formation of Joint Committee.—The scientific investigation required for the provision of effective substitutes cannot be carried out by the individual farmer, and in this matter it is especially necessary that farmers should be in the closest possible touch with the central authorities who have the best scientific advice at their disposal.

A small Joint Committee—consisting of Mr. Anker Simmons (Ministry of Food), Professor T. B. Wood (Board of Agriculture), and Mr. T. H. Middleton (Food Production Department)—is therefore being set up with a view to laying before farmers—

(*a*) Actual facts about the food supply ;
(*b*) The grave responsibility resting on the farmers with regard to the increased production of corn, potatoes and milk ;
(*c*) Information as to how farmers should modify their normal practice so as to ensure the necessary increase.

It is proposed that public meetings should be arranged early in the new year at all market centres for discussion on agricultural policy, and that literature and information to farmers should be made available in market places and every market town. (*National Food Journal*, 23rd January, 1918.)

Oats : Desirability of Crushing before Feeding to Stock.

IN view of the serious shortage of feeding stuffs, the President of the Board of Agriculture and Fisheries desires to urge strongly upon farmers and horse-owners the necessity for exercising the utmost economy in the use of oats for stock-feeding purposes. Many stock owners have hitherto been accustomed to feed oats whole, but there can be no doubt that oats fed in this way are very often imperfectly digested, especially in the case of animals with bad teeth and with " bolters." In the interests of economy, therefore, it is desirable that oats, if used at all, should be crushed before feeding.

THE following Notice has been issued by the Food Production Department of the Board :—

Supplies of Seed Oats.

With a view to supplementing the supplies of seed oats which will be required by farmers for sowing in the spring on recently broken land, the Food Production Department has made arrangements to secure—

(*a*) White oats of the " Abundance " type from the Isle of Man ;
(*b*) Black Tartarian oats from Ireland ;
(*c*) Varieties of white oats from Scotland.

Supply of Manx white oats are now available f.o.r. Liverpool. Supplies of Irish Black Tartarian oats will be available after the 20th

January, 1918, *ex* Avonmouth and other western ports, and supplies of Scottish seed oats will be available early in February.

Farmers requiring supplies of seed oats should send particulars of their requirements to the Secretary of the Agricultural Executive Committee for the county. Farmers who are prepared to take *not less than* 25 *qr*. (*of* 336 *lb.*) *of any one variety* may apply direct to the Director-General, Food Production Department, 72, Victoria Street, London, S.W. 1. Envelopes should be marked "Supplies Division—Oats" in the left-hand corner.

Applications for supplies of these oats should be made without delay, in order that they may be delivered in ample time for sowing.

THE following Order (No. 116), dated the 28th January, 1918, has been made by the Food Controller:—

The Horse and Poultry Mixtures Order, 1917: General Licence.

On a sale of a poultry mixture in cotton bags provided by the maker of the mixture, a charge may be made for the bags at the rate of 2*s*. per cwt. of the mixture subject to such charge being shown as a separate item on the invoice relating to the sale, and the amount thereof being repayable on the return of the bags in good condition.

Poultry Foodstuffs.

A MEETING of the Poultry Advisory Committee, held on the 28th January, 1918, was attended by Sir Daniel Hall, Secretary of the Board of Agriculture, who explained the position with regard to animal foodstuffs.

Sir Daniel stated that the estimated quantity of foodstuffs in Great Britain was insufficient to maintain the existing stocks of animals and poultry until this season's crop became available in September.

The Government Departments concerned were therefore considering plans for rationing all classes of livestock. No final decisions had as yet been made*, but Sir Daniel felt at liberty to state that milch cows and working horses would receive the major portion of the available foodstuffs. Other stock owners must therefore be prepared to considerably reduce their stocks and to feed the remainder principally on roots, fodder crops, grass, etc.

The Board of Agriculture were claiming a strictly limited amount of foodstuffs for poultry feeding, which would be sufficient to maintain but a small proportion of the existing head of poultry.

The Committee estimate the quantity of foodstuffs mentioned by Sir Daniel will maintain about one-twentieth of the normal poultry stocks. The Committee therefore feel it to be their duty to immediately inform poultry keepers of this serious position in order that they may adjust their operations to meet the new conditions.

Fuller official statements with regard to the position will be issued shortly. In the meantime the Committee have been asked to devise a scheme of rationing the foodstuffs allotted to poultry among the best poultry stocks in order that the country may be re-stocked as foodstuffs become available.

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* See p. 1177.

THE following Notice, dated the 2nd February, 1918, has been issued by the Board:—

Food for Poultry Rearing.

Many inquiries from poultry-keepers are being received by the Board of Agriculture asking for advice as to the policy they should adopt with regard to the rearing of birds for the coming season. At this time poultry-keepers under normal conditions would be preparing to raise their stocks for the year, thousands of eggs would be put in incubators, orders would be given for day-old chicks, poultry-keepers, large and small, would be laying their plans for rearing the birds which are to produce eggs next autumn or spring and to be fattened later in the year. Under these conditions the Poultry Advisory Committee have asked the Board of Agriculture for information as to the situation with regard to poultry food, because if no food is found for them it would be worse than waste to raise the chickens. The Board of Agriculture has been compelled to tell the Committee that the best that can be hoped for is to obtain for poultry a small allowance of damaged grain, screenings and similar materials that could not be used for human food, *roughly one-twentieth of the food* usually available between now and harvest which will as far as possible be reserved for the preservation of the most useful stocks. Under these circumstances the poultry-keeper cannot be advised to set about rearing as usual; *he must assume that he will not be able to buy his previous supplies and must therefore only rear the birds that he can himself provide for*, and then feed upon waste and upon the materials he can grow. Even with this severe limitation a good many birds can be raised; during the summer they can pick up their own living to a certain extent, and in the autumn if food is not forthcoming to bring them on for laying, at the worst they can be killed for eating.

The Deer (Restriction of Feeding) Order, 1918.

BY an Order (No. 22), dated the 14th January, 1918, made by the Food Controller, no person shall, after the 21st January, 1918, feed any deer or permit any deer to be fed with any cereals or other provided food except with acorns, chestnuts or salt, or with hay grown within the deer forest, park or other area in which the deer are preserved.

The Sheep (Sales) Order, 1918.

AN Order (No. 37), dated the 15th January, 1918, has been made by the Food Controller to the effect that:—

1. *Slaughter of Sheep.*—(*a*) No person shall, on or after the 28th January, 1918, slaughter any sheep unless such sheep has within the fourteen days immediately preceding the day of slaughter been sold and bought in a market.

(*b*) The restriction of slaughter imposed by this Clause shall not apply to—

(i) Slaughter of a sheep under the powers conferred by the Diseases of Animals Act, 1894 to 1914, or any Order made thereunder;

(ii) Slaughter of a sheep if, in the opinion of a person authorised by the Food Controller or the Board of Agriculture and Fisheries, or the Board of Agriculture for Scotland, the slaughter is desirable for any exceptional reason or purpose; or

(iii) Slaughter by a farmer for consumption in his own household of a sheep owned by him; provided that notice of such slaughter is given within seven days thereafter to the Food Control Committee for the area in which the farmer resides.

2. *Sales of Beasts to be Made in Market.*—(*a*) No person shall on or after the 14th January, 1918, sell or buy or offer to sell or buy any sheep for slaughter unless the sheep is at the time of such sale or offer in a market.

(*b*) A sheep shall be deemed to be bought for slaughter if it be slaughtered within 28 days of the purchase.

3. *Retrictions on Sales in Markets*—No sheep fit for slaughter shall on or after the 14th January, 1918, be sold in any market except in accordance with the following provisions:—

(*a*) The sheep shall have been valued by a person authorised by the Food Controller to ascertain its fair value;

(*b*) The price shall not exceed the fair value so ascertained; and

(*c*) The sheep may be sold only to a person who is authorised by the Food Controller to buy in a market live stock fit for slaughter.

4. *Ascertainment of Fair Value.*—For the purpose of ascertaining the fair value, the person authorised under the preceding Clause shall estimate the dressed weight of the carcase of the sheep, and the fair value of the sheep shall be a sum at the rate of 1*s.* 2½*d.* per lb. on the weight of the dressed carcase as so estimated, together with the current market value of the skin as estimated by such person, less the sum of 1*s.* 6*d.*; provided that in any particular case such person may determine that a sheep shall be sold on the footing that the actual dressed weight of the carcase shall be taken in lieu of the estimated weight.

5. *Determination of Questions.*—The determination of the person authorised in that behalf by the Food Controller shall be conclusive upon the question whether a sheep is fit for slaughter and as to the weight and fair value of any sheep.

6. *Directions as to Weighing.*—All persons concerned shall comply with any directions given as to the weighing of any sheep, and as to the method of sale, whether in lots or otherwise, of any sheep, and as to any other matter relating to the maximum price which may be given for the purposes of this Order by any person authorised in that behalf by the Food Controller.

7. *Interpretation.*—For the purpose of this Order—

"Market" shall include fair, and any other place which the Food Controller shall determine to be a market for the purposes of this Order.

"Sheep" shall mean any ovine animal.

"Dressed carcase" shall mean the carcase without the skin, head, pluck, intestines, loose fat, feet and shanks, the feet being cut off at the hocks and the shanks at the knees.

AN Order (No. 9), dated the 4th January, 1918, has been made by the Food Controller to the effect that :—

The Rabbits (Prices) Order, 1918.

1. *Maximum Price on Sales of Rabbits.*—(*a*) No person shall, after the 14th January, 1918, directly or indirectly sell or offer or expose for sale or buy or offer to buy a rabbit or part thereof at a price exceeding the maximum price provided by or in pursuance of this Order.

(*b*) Until further notice the maximum price for a wild rabbit shall be 2*s*. if the pelt or skin be included in the sale, or 1*s*. 9*d*. if the pelt or skin be not included in the sale, and for part of a wild rabbit shall be at the rate of 10*d*. per lb. on the weight of the part sold, skinned and cleaned.

(*c*) The Food Controller may from time to time by notice prescribe other prices for rabbits or parts of rabbits.

2. *Power of a Food Committee.*—A Food Committee may from time to time by resolution as respects sales within their area of rabbits or parts of rabbits vary the maximum price under this Order as fixed for the time being by the Food Controller, but ;

(*a*) Every such resolution shall be reported to the Food Controller within seven days, and in the case of a resolution increasing the maximum price shall not take effect until the same has been sanctioned by the Food Controller ; and

(*b*) Every resolution made by a Food Committee under this Clause shall be subject at any time to review by the Food Controller and shall be withdrawn or modified as he may direct.

3. *Terms of Sale.*—Subject to any directions to the contrary in any notice issued by the Food Controller under this Order, and subject also as respects the area of a Food Committee to any directions contained in any resolution of a Food Committee varying the maximum price—

(*a*) In calculating the price any broken half-penny shall count as a half-penny ; and

(*b*) No additional charge may be made for bags or other packages or for giving credit or making delivery.

4. *Contracts.*—Where the Food Controller is of opinion that the price payable under any contract for the sale of rabbits is such that the same cannot at the price for the time being permitted under this Order, or any notice hereunder, be sold by retail at a reasonable profit, he may, if he thinks fit, cancel such contract or modify the terms thereof in such manner as shall appear to him to be just.

5. *Notices.*—Every person selling rabbits by retail in any shop or from any stand, cart, barrow or other vehicle, shall keep posted in a conspicuous position, so as to be clearly visible to all customers throughout the whole time during which rabbits are being sold or exposed for sale, a notice showing in plain words and figures the maximum price for the time being in force under this Order as to sales in such shop or from such stand, cart, van or other vehicle.

6. *Fictitious Transactions.*—No person shall in connection with the sale or disposition or the proposed sale or disposition of any rabbit or part thereof enter or offer to enter into any fictitious or artificial transaction or make or demand any unreasonable charge.

7. *Exception.*—This Order shall not apply to a sale of a live rabbit or to a sale by retail of cooked rabbit by a person in the ordinary way of his trade.

8. *Interpretation.*—For the purposes of this Order, the expression "Food Committee" shall mean a Committee constituted in pursuance of the Food Control Committees (Constitution) Order, 1917, and the Food Control Committee appointed for Ireland.

"Wild rabbit" shall include all rabbits whether imported or not, except rabbits proved to have been bred in captivity.

The Meat (Maximum Prices) Order, 1917: General Licence.

THE Food Controller, by an Order (No. 32), dated the 14th January, 1918, authorises as from the date of the Order the addition on any wholesale sale of home-killed mutton or lamb of a sum at the rate of ¾*d.* per lb. to the price for the time being in force under the Order on a wholesale sale of home-killed mutton or lamb, but so that any sum added under this licence shall be deducted in determining for the purposes of such Order, the actual cost of meat to a person selling meat by retail and for all other purposes connected with the prices chargeable on a retail sale.

Live Stock (Restriction of Slaughter) Order, 1917: Authorisation as to Granting of Licences.

An Order (No. 34), dated the 12th January, 1918, has been made by the Food Controller as follows:—

The Food Controller hereby authorises the Board of Agriculture and Fisheries and the Board of Agriculture for Scotland by their appointed officers to act for the purposes of Clause 4 (*c*) of the above Order, and accordingly to grant licences for the slaughter of animals to which such Order applies.

(Clause 4 (*c*) of the Order is as follows:—" The restriction of slaughter imposed by this Order shall not apply to: . . . (*c*) Slaughter of an animal if, in the opinion of a person authorised in that behalf by the Food Controller, the slaughter is desirable for any exceptional reason or purpose.")

The Live Stock (Restriction of Slaughter) Order, 1917: General Licence.

THE following Order (No. 86), dated the 28th January, 1918, has been issued by the Food Controller:—

The Food Controller hereby authorises, until the 1st March, 1918, the sale and supply of meat derived from male lambs bred from the Dorset Horn ewe.

Maximum Retail and Wholesale Prices.

THE following is a list of Retail and Wholesale Maximum Prices of certain agricultural commodities fixed by the Food Controller (extracted from the *National Food Journal*, 23rd January, 1918):—

RETAIL MAXIMUM PRICES.

Damaged Grain, Seeds, and Pulse—

For quantities not exceeding 7½ qr., add to wholesale prices	4*s.* per 480 lb.
For quantities of less than half a qr.	8*s.* "

Potatoes : Ware—

Sold by grower, quantities less than 1 cwt. .. .. .. 1*d.* per lb.
Sold by retailer, the following scale :—

Retailer's Buying Price per cwt. for Potatoes Delivered at the Place at which he usually Takes Delivery.	Highest Authorised Retail Selling Price over the Counter.		
	Per Stone of 14 lb. for Lots of 14 lb. or more.	Per Half Stone for Lots of 7 lb. or more, but less than 14 lb	Per lb. for Lots of less than Half Stone.
	s. *d.*	*s.* *d.*	*s.* *d.*
Any price up to and including 3*s.* 3*d.*	0 7	0 3½	0 0½
Exceeding—			
3*s.* 3*d.* but not exceeding 3*s.* 7*d.* ..	0 7½	0 4	0 0¾
3*s.* 7*d.* ,, ,, 3*s.* 11*d.* ..	0 8		
3*s.* 11*d.* ,, ,, 4*s.* 2*d.* ..	0 8½	0 4½	
4*s.* 2*d.* ,, ,, 4*s* 6*d.* ..	0 9		
4*s.* 6*d* ,, ,, 4*s* 9*d* ..	0 9½	0 5	
4*s.* 9*d.* ,, ,, 5*s.* 1*d.* ..	0 10		
5*s.* 1*d.* ,, ,, 5*s.* 4*d.* ..	0 10½	0 5½	0 1
5*s.* 4*d.* ,, ,, 5*s.* 8*d.* ..	0 11		
5*s.* 8*d.* ,, ,, 5*s.* 11*d.* ..	0 11½	0 6	
5*s.* 11*d.* ,, ,, 6*s.* 3*d.* ..	1 0		
6*s.* 3*d.* ,, ,, 6*s.* 7*d.* ..	1 0½	0 6½	
6*s.* 7*d.* ,, ,, 6*s.* 11*d.* ..	1 1		
6*s.* 11*d.* ,, ,, 7*s* 2*d* ..	1 1½	0 7	
7*s.* 2*d.* ,, ,, 7*s.* 6*d.* ..	1 2		
7*s.* 6*d.* ,, ,, 7*s.* 10*d* ..	1 2½	0 7½	0 1¼
7*s.* 10*d.* ,, ,, 8*s* 1*d* ..	1 3		
8*s.* 1*d.* ,, ,, 8*s.* 5*d.* ..	1 3½	0 8	
8*s.* 5*d.* ,, ,, 8*s.* 8*d.* ..	1 4		
8*s.* 8*d.* ,, ,, 9*s* 0*d.* ..	1 4½	0 8½	
9*s.* 0*d.* ,, ,, ...	1 5		

Potatoes : Seed—

Variety of Potato.	Highest Authorised Selling Price per Stone.		
	Class I. (Grown in Scotland or Ireland in 1917).	Class II. (Once Grown in England or Wales).	Class III. (Twice Grown in England or Wales).
	s. *d.*	*s* *d.*	*s.* *d.*
Myatt's Ashleaf Kidney ..	4 0	3 6	3 3
Edzell Blue			
Early Puritan	3 6	3 0	2 6
Duke of York			
Sharpe's Express			
Eclipse			
May Queen			
Midlothian Early			
Sir John Llewelyn			
Nineyfold	3 0	2 9	2 3
Beauty of Hebron			
Early Rose			
Epicure	2 6	2 3	2 0

(*Note.*—For the above-mentioned varieties, the wholesale prices are left free within the maximum prices shown above.)

Potatoes: Seed—*continued.*

For varieties other than those above mentioned—

(*a*) Sold by grower to actual planter in quantities of 1 cwt. or less	1*s*. 3*d*. per stone.
(*b*) Sold by registered dealer retail in seed potatoes—	
(i.) In quantities of more than 1 ton of any one variety, price not to exceed cost to retailer by more than	£1 per ton.
(ii.) In quantities of 1 ton or less, but more than 1 cwt. of any one variety, price not to exceed cost to retailer by more than	£2 5*s* per ton.
(iii.) In quantities of 1 cwt. or less or any one variety the following scale:—	

Retailer's Buying Price per cwt. at Place at which he Ordinarily Takes Delivery.	*Highest Retail Selling Price for Lots of 1 Cwt. or less of any One Variety Per Stone.* *s.*	*d.*
Up to and including 5*s*. 6*d*.	1	0
Exceeding—		
5*s* 6*d*. but not exceeding 6*s*.	1	1
6*s*. 0*d*. ,, ,, 6*s* 6*d*.	1	2
6*s*. 6*d*. ,, ,, 7*s* 0*d*.	1	3
7*s*. 0*d*. ,, ,, 7*s* 6*d*.	1	4
7*s*. 6*d*. ,, ,, 8*s* 0*d*.	1	5
8*s*. 0*d*. ,, ,, 8*s*. 6*d*.	1	6
8*s*. 6*d*. ,, ,, 9*s*. 0*d*.	1	7
9*s*. 0*d*. ,, ,, 9*s*. 6*d*.	1	8
9*s*. 6*d*. ,, ,, 10*s* 0*d*.	1	9
10*s*. 0*d*. ,, ,, 10*s*. 6*d*.	1	10
10*s*. 6*d*. ,, ,, 11*s* 0*d*.	1	11
11*s*. 0*d*. ,, ,, 11*s* 6*d*	2	0
11*s*. 6*d*. ,, ,, 12*s* 0*d*.	2	1
12*s*. 0*d*. ,, ,, 12*s*. 6*d*.	2	2
12*s*. 6*d*. ,, ,, 13*s* 0*d*.	2	3
13*s*. 0*d*. ,, ,, 13*s*. 6*d*.	2	4
13*s*. 6*d*. ,, ,, 14*s*. 0*d*.	2	5
14*s*. 0*d*.	2	6

For lots of less than one stone the rate per stone may be charged and the price levelled up to the nearest penny.

An extra charge may be made by the retail dealer if he delivers the seed potatoes to his customers' premises.

Onions	3*d*. per lb.

Poultry Mixtures or Horse Corn Mixtures—

Profits permitted on cost price:—

More than 6 cwt.	1*s*. per cwt.
Less than 6 cwt. and not less than 3 cwt.	3*s*. ,,
Less than 3 cwt. and not less than ½ cwt.	4*s*. ,,
Less than ½ cwt.	½*d*. per lb.

Horse Chaff Mixtures—

1 ton or more	1*s*. per cwt.
Less than 1 ton and not less than 5 cwt.	2*s*. ,,
Less than 5 cwt. and not less than ½ cwt.	3*s*. ,,
Less than ½ cwt.	1*s*. per 14 lb.

Rabbits, Wild—

Including pelt or skin	2*s*.
Without the skin	1*s*. 9*d*.
For part, skinned and cleaned	10*d*. per lb.

WHOLESALE MAXIMUM PRICES.

Damaged Grain, Seeds, and Pulse—

Imported feed wheat	72s. per 480 lb.
Damaged imported wheat	65s. ,,
Damaged imported rye	65s. ,,
Damaged imported maize	65s. ,,
Damaged imported and home-grown pulse and seeds (other than oil seeds) used for feeding purposes ..	65s. ,,
Damaged imported barley	55s. per 448 lb.
Damaged imported oats	41s. per 336 lb.

Grain. Home-Grown of 1917 crop—

Date of Delivery.	Wheat and Rye, per qr. of 504 lb.		Oats, per qr. of 336 lb.		Barley, per qr. of 448 lb.	
	s	*d*	*s*	*d*	*s.*	*d.*
January, 1918	74	6	45	3	62	9
February or March, 1918 ..	75	6	46	3	62	9
April or May, 1918	76	9	47	3	62	9
On or after 1st June, 1918 ..	77	9	48	6	62	9

Oats, for human food	*add* 3s. per qr.
Barley, bought for manufacturing purposes under licence (not by a flour miller)	*add* 5s 3*d* per qr.
Wheat and Rye, unfit for milling or tailings and dressings	*deduct* 7s per qr.
Barley, unfit for milling, or tailings and dressings ..	*deduct* 7s 9*d* per qr.
Oats, improperly cleaned, or tailings and dressings ..	*deduct* 5s per qr.
Grain, bought by flour miller from recognised dealer, not producer	*add* 1s. per qr.
Grain, bought by non-miller from recognised dealer, not producer	*add* 2s. to 8s. per qr.

Cattle Foods—

	Per ton.	
Home Manufactured Cakes—	£	*s.*
Linseed cake	19	0
Decorticated ground nut cake	19	0
Sesame cake	18	10
Undecorticated ground nut cake	17	5
Copra cake	16	5
Cotton seed cake	14	10
Rape cake	14	0
Palm kernel cake	13	15
Home Manufactured Meals—		
Soya meal	18	15
Rape meal	14	0
Palm kernel meal	13	10
Imported Cakes and Meals—		
Repressed cotton cake	20	15
Decorticated cotton seed meal	19	15
Decorticated cotton-seed cake	19	15
Argentine linseed cake	19	15
Canadian linseed cake	19	10
Australian linseed cake	19	10
Spanish and Portuguese cake	19	10
North American linseed cake	19	5
Hominy chop	17	15
Maize meal cake	17	5
Gluten feed	17	5

Cattle Foods—*continued.*	*Per ton.*
Imported Cakes and Meals—continued	£ s.
Canadian rice meal	17 0
Egyptian rice meal	17 0
Rangoon rice meal	16 10
Egyptian cotton seed cake	15 0
Italian rice meal	14 10
Compound Cakes—	
Cakes containing not less than—	£ s. d.
7% oil not less than 20% albuminoids	17 15 0
6% " " 20% "	17 10 0
6% " " 17% "	17 7 6
Miller's Offals—	
Broad bran and fine offals	14 0 0
Medium offals	13 10 0
Bran	13 0 0

Horse Mixtures and Poultry Mixtures—

Profits permitted on cost price	30*s.* per ton.

Onions, British—

If sold by grower	£15 per ton.
If sold other than by grower	£19 "

Pigs, live weight	18*s.* per 20 lb.

Potatoes, Seed—

(*a*) *Maximum Growers' Price ;* In accordance with the following Schedule—

Variety of Potato.	Maximum Grower's Price, free on rail.		
	Class I (Grown in Scotland and Ireland in 1917).	Class II. (Once Grown in England and Wales).	Class III. (Twice Grown in England and Wales).
	£ s d.	£ s d	£ s d.
King George V	9 0 0	7 10 0	7 0 0
Great Scot			
Lochar			
Templar			
Royal Kidney	7 10 0	6 15 0	6 10 0
British Queen			
Pioneer			
Queen Mary			
Evergood	7 5 0	6 10 0	6 10 0
King Edward VII.	7 0 0	6 10 0	6 10 0
Arran Chief			
Langworthy			
What's Wanted			
Golden Wonder			
Irish Queen			
Shamrock			
Abundance			
President			
Iron Duke			
Scottish Farmer			
Any other varieties not specified in either this list or the list of varieties named with retail prices, and not sold under licence	6 15 0	6 10 0	6 10 0

A MEETING of the Agricultural Wages Board was held on the 31st January at 80, Pall Mall, London, S.W., Sir Ailwyn Fellowes presiding.

Meeting of Agricultural Wages Board.

The Selection Committee appointed to consider the names of persons suggested as suitable representatives of employers and workers respectively for District Wages Committees, presented recommendations in regard to the District Committees for (1) Norfolk, (2) Northampton (including Soke of Peterborough), and (3) Hertfordshire and Middlesex. The first selection of names had been made by the respective sides of the Wages Board as a whole, who had been supplied with the complete lists of all the names received, and the recommendations of the Selection Committee were based on a careful review of the suggestions made in this way by the two sides. The recommendations of the Selection Committee were approved and, with the addition of the impartial members appointed in each case by the Board of Agriculture and Fisheries, District Committees were formally established for these districts.

Mr. W. R. Smith, on behalf of the workers' representatives, referred to certain cases in which farmers had objected to men in their employment serving on District Wages Committees. Mr. Padwick, on behalf of the employers' representatives, said that he and his colleagues unanimously condemned any such action, and stated that they would make their views on the subject public.

Mr. Acland presented an Interim Report from the Committee appointed to consider the principles to be adopted in assessing the value of cottages in connection with a minimum wage, and said that the Committee were making progress but that the subject was beset with difficulties. A general discussion took place, in the course of which the present shortage of cottages in rural districts was referred to as aggravating the difficulties of dealing with the matter. Allusion was made by several workers' representatives to the objection to the "tied cottage" system, more particularly in the case of cottages not actually situated on the farm.

Sir Henry Rew presented an Interim Report from the Committee on "allowances," which stated that the Committee were agreed that as a general principle payment of wages entirely in cash should be aimed at, but that under present conditions it would probably be desirable to recognise certain allowances in kind which had been long established in some districts. The Committee were seeking further information in detail on various points before making any recommendations on the subject

The institution by the Board of Agriculture of an investigation into the wages and conditions of agricultural employment throughout the country was reported to the Wages Board.

THE following Notice, dated the 31st January, 1918, has been issued by the Agricultural Wages Board:—

Agricultural Wages Board: Statement by Representatives of Employers.

The Agricultural Wages Board is now engaged in establishing District Wages Committees throughout the country, and has to select an equal number of representatives of employers and workers on each Committee. In certain cases workers who have been invited by the Wages Board to serve as representatives state that their employers have raised objections and, in one or two cases, have even gone so far as to threaten men with dismissal if they accept the invitation to serve on a District Wages Committee. We, as the representatives of farmers on the Wages Board, wish to express our earnest hope that no employer will place any difficulty whatever in the way of a man who may be selected to represent his class. We are convinced that the future of British Agriculture largely depends upon the co-operation between capital and labour in farming, which we believe the Agricultural Wages Board and the District Wages Committees will promote. We have already found that the representatives of workers on the Wages Board are prepared to work with us in a reasonable and broad-minded spirit, and we believe that they, like ourselves, will discuss questions on which we may differ with a sincere desire to establish and maintain fair and friendly relations between employers and employed. Nothing, in our opinion, would be more detrimental to the interests of agriculture than an attempt by individuals to interfere with or impede the acceptance by any man of an invitation to represent his class, and we confidently appeal to the patriotism and good sense of farmers generally to recognise that the selection without hindrance by workers of their representatives is essential to the establishment of District Wages Committees on a sound and satisfactory basis.

Colin Campbell.
John Evens.
W. S. Gibbard.
Robert W. Hobbs.
Michael H. Holman.
Saml. Kidner.
W. S. Miller.
Andrew Moscrop.
F. Ivo Neame.
Henry Overman.
H. Padwick.
R. G. Patterson.
G. G. Rea.
Roland R. Robbins.
John Roberts.
S. T. Rosbotham.

The following Circular Letter, dated the 7th February, 1918, has been addressed to Agricultural Executive Committees by the Board :—

Improvement of Local Transport.

Sir,—1. The Board of Agriculture and Fisheries are desirous of collecting the detailed views and suggestions of agriculturists throughout England and Wales, on the question of the improvement of local transport after the War.

2. The President is reluctant to trouble Agricultural Executive Committees and District Committees with this question at the present time, but he feels that it is one in which they would naturally take much interest, and on which their experience and opinions as representing the farming community would be of such value that he has decided to invite their co-operation ; and I am to say that he will be greatly obliged if he can be favoured with the views of your Committee and any information which they may be able to supply in reply to the following questions :—

(*a*) Are there in your district any localities in which after the end of the War additional transport facilities (apart from increases of existing services) will so far as can be foreseen be permanently required for the carriage of substantial quantities of goods or numbers of passengers to and from markets or railway stations ?

(*b*) If so, should the facilities take the form of—

(1) an extension of the existing railway system ;
(2) a light railway or tramway ;
(3) a road motor service ;
(4) the provision or improvement of water transport ?

(*c*) Between what points and by what route should these additional facilities be provided ?

(*d*) What are the limits of the area which would be served by the additional facilities recommended, and what is the character of the traffic that would be offered for carriage ?

(*e*) Would there be any special difficulty, from such causes as steep gradients, narrow or bad roads, etc., in providing the additional facilities recommended ?

(*f*) Is there any prospect, so far as an opinion is now possible, that the service proposed would be financially successful ?

3. Your Committee will, no doubt, consult the District Committee if they think it desirable, and also the Agricultural Executive Committee of any other county concerned in a scheme which finds favour with your Committee

4. It will be understood that this inquiry does not relate to the immediate improvement of transport facilities as they exist under war conditions, but is directed solely to the question what can and should be done after the War to effect a permanent improvement in the conditions as they will then present themselves.

I am, etc.,
(Signed) A. D. HALL,
Secretary.

Nitrate of Soda Executive.

IN accordance with decisions reached at the Inter-Allied Conference, held in Paris from 29th November to 3rd December, a Nitrate of Soda Executive has been formed to deal with the purchase and supply of nitrate of soda in Chile for the British, French, Italian and United States Governments.

This Executive will have its offices at Empire House, Kingsway, London, W.C. 2

Sir Edmund Wyldbore Smith, the Director of the Commission Internationale de Ravitaillement, has been appointed Chairman, and Major Paul Stomm will act as Secretary.

All questions concerned with the purchase, sale and shipment of nitrate of soda, the supply of fuel, bags, machinery, etc., should be addressed to the Secretary at the above address. (*Board of Trade Journal*, 17th January, 1918.)

Supply of Sulphate of Ammonia.

THE following Letter (No. 8/S 2), dated the 16th January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

DEAR SIR,—I beg to draw your attention to the enclosed copy of a Circular which it has been necessary to issue to approved agents, because the total output of sulphate of ammonia up to May 31st next has now been sold by the manufacturers either to merchants or direct to farmers. You will understand that this does not mean that approved agents can supply no more sulphate of ammonia from now onwards. Both their existing stocks and the amount to be produced between now and 31st May next will be available for delivery to farmers.

The purpose of the Circular to approved agents is to prevent them disappointing farmers by accepting orders in excess of the amounts which they have either in stock or on order from manufacturers.

As the whole season's supply has been contracted for, it is obviously impossible to compel the approved agents to carry out their undertaking to maintain a fixed quantity in store until the date agreed by them with your Committee.

It now appears that the total amount of sulphate of ammonia available for the current season will be about 35,000 tons in excess of last season.

Yours faithfully,
(Signed) LAWRENCE WEAVER,
Director of Supplies.

Enclosure. (*Reference No.* 9/S.).

DEAR SIR,—*Sulphate of Ammonia.*—I have to inform you that the Department estimates that the whole output of the sulphate of ammonia manufacturers to May 31st next has already been contracted for, with the exception of comparatively small amounts which will be produced from local gas works. The Sulphate of Ammonia Distribution Committee cannot therefore book any further orders for the present, and you must assume that you will get no further supplies than those for which you have already contracted. If it should happen that the output is larger than anticipated, and that there is an available surplus, I will so inform you at a later date.

In these circumstances it may be impossible for you to fulfil the undertaking you have given to the County Agricultural Executive Committee to maintain your stock of sulphate of ammonia up to a given date, and I am to advise you to lose no time in delivering to farmers the whole of the stocks you have in hand even though that should involve your being sold out at an early date.

Yours faithfully,
(Signed) LAWRENCE WEAVER,
Director of Supplies.

Finger-and-Toe Disease: A Correction.

IN a short article on club root, which appeared in the December number of the Board's *Journal*, page 999, it was inadvertently stated that mangolds and lettuce were liable to be attacked by this disease. This statement is incorrect. Club root is confined in its attacks to members of the cabbage, turnip and swede family (natural order *Cruciferæ*), and does not attack beet, mangold, potato, or any other root crop.

Cultivation of Osiers.

THE following Memorandum (No. 16/C. 1), dated the 9th January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Reports have reached the Department that in some cases Agricultural Executive Committees are giving orders for osier-beds to be pulled up, presumably with the view of cultivating the land for a food crop.

There is a great shortage of osier and willow throughout the country, and consequently an insufficient supply of market baskets : and a large amount of fruit and vegetables has been lost thereby during the past season. Nothing should be done, therefore, by Executive Committees to diminish the area devoted to the production of osiers.

The counties principally concerned in osier cultivation are: Berkshire, Buckinghamshire, Cambridgeshire, Derbyshire, Hampshire, Huntingdonshire, Lancashire, Leicestershire, Lincolnshire, Middlesex, Nottinghamshire, Oxfordshire, and Somerset; but small areas of willow and osier are to be found all over the country. These should be conserved in every case where basket-making is, or has been in the past, a local industry.

Basket Making by Soldiers.

AN interesting scheme for the training of disabled soldiers in basket making has been organised jointly by the Ministry of Pensions, the Ministry of Labour, and the Food Production Department. The financial arrangements are in the hands of the Ministry of Pensions, which will defray the cost of training and the capital expenditure involved in the workshops. The Food Production Department will supply an organiser for the scheme who will treat with the local War Pensions Committees and generally assist in bringing together the fruit growers, who are suffering from a shortage of baskets, and the basket works. There is almost a famine in baskets for the fruit and vegetable trade at present, and among other ways of meeting this it has been suggested that prisoners of war should be employed at Evesham and elsewhere on this work.

Petrol Licences for Farmers.

THE following Memorandum (No. 49/M. 8), dated the 28th January, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

It is generally understood that applications for licences for petrol required for the production of food, as distinguished from its distribution, should be dealt with by Agricultural Executive Committees.

Applications for licences for petrol for use in distributing farm produce are dealt with by the Ministry of Food, Grosvenor House, Upper Grosvenor Street, W. 1.

Speaking broadly, the distinction is being observed, but cases have arisen where Agricultural Executive Committees have recommended the issue of licences for petrol to farmers who need it solely for the purpose of conveying their produce to the railway, or to market. Since this operation is a matter of distribution, applicants for licences for the purpose should in all cases be referred to the Ministry of Food.

Treasury Grants for Cold Storage.

ARRANGEMENTS are now complete with the Treasury for grants amounting to approximately three-quarters of a million pounds to the Ministry of Food for the necessary loans to be made towards the provision of additional cold storage space in some of the principal parts of the United Kingdom. This assistance is justified by the urgency of the matter from the point of view of the national food supply, and by the fact that the bodies to which the grants are being made would not in ordinary circumstances be compelled by the exigencies of their business to carry out the proposed extension at a time when the installation is necessarily costly. It is expected that extensive additional accommodation will be rendered available during the first six months of the current year.

The "Scottish Journal of Agriculture."

THE Board of Agriculture for Scotland have just issued the first number of their new Journal, the *Scottish Journal of Agriculture*. The issue is dated January, 1918, and will be continued quarterly at the price of 6*d*. per copy, post free 8*d*., obtainable through any bookseller or direct from H.M. Stationery Office. The first number opens with an introduction by the Rt. Hon. Robert Munro, K.C., M.P., in which he expresses great hopes for the future of Scottish Agriculture and Forestry. The Journal contains many interesting articles, chiefly dealing with the position of agriculture as affected by the War. There is also a section headed "Recent Periodical Literature," consisting mainly of extracts from and summaries of recent bulletins of the International Institute of Agriculture, while under the heading "Official Orders and Circulars" various Statutory Rules and Orders bearing on Agriculture are given. The last pages contain statistical tables dealing with areas under cultivation, prices of agricultural produce, etc., in Scotland.

The "Board of Trade Journal."

A NEW series of the *Board of Trade Journal*, in an enlarged and revised form, was commenced from the 3rd January, 1918. The price of the new Journal is 6*d*. per copy, and copies may be obtained, as before, direct or through any bookseller, from H.M. Stationery Office. Hitherto the *Journal* has been in the main the medium through which intelligence collected by the Department of Commercial Intelligence, and intended for general information, is conveyed to the public. It is now proposed to widen its scope by including articles dealing generally with all the activities of the Board of Trade, as well as those of the new joint Department of the Foreign Office and Board of Trade—the Department of Overseas Trade (Development and Intelligence)—in which the former Department of Commercial Intelligence is now comprised.

The *Journal* retains many of its old features, and in its new form will undoubtedly make a wider appeal to business men.

The Milk (Registration of Dealers) Order, 1918: General Licence.

BY an Order (No. 156), dated the 4th February, 1918, the Food Controller excepts from the operation of Part II. of the Milk (Registration of Dealers) Order, 1918,[*] producers of milk who on the average sell by retail less than five imperial gallons of milk per day.

Milk Prices.

IN confirmation of the statement made by Lord Rhondda to a Deputation from the National Farmers' Union on the 31st January, 1918, the following official announcement is issued jointly by the Board of Agriculture and the Ministry of Food:—

The normal maximum prices to be paid by dairymen to milk producers from the 1st April to the 30th September will be as follows:—

April ..	1*s*. 6*d*. per gal.	July	1*s*. 2*d*. per gal.
May and June	1*s*. 0*d*. ,,	August and September	1*s*. 3*d*. ,,

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[*] See this *Journal*, p. 1301.

These prices have been decided upon after close consideration of the probable costs of production during the spring and summer months; they do not include the cost of delivery to the purchaser's station. Though this arrangement makes the purchaser responsible for the cost of delivery, it does not alter the custom by which the farmer is responsible for ensuring delivery to the purchaser's station; the producer's liability will not end until the buyer obtains delivery.

Should no unforeseen circumstances arise, these prices are to be regarded as maximum prices. But if there should be a serious drought during the early summer, it will be open to the Food Controller, in consultation with the President of the Board of Agriculture, to raise the price to a sufficiently remunerative level.

In contrasting the above prices with the corresponding prices last year, it should not be forgotten that the prices in 1917 included the cost of delivery from the farm to the purchaser's station. Further, it is now intended that summer and winter prices shall be independent and cover the costs of production during the period, instead of allowing such a profit in the summer as would make up for losses in the winter. The current winter prices were arranged on a scale which was intended to cover the costs of winter production in 1917–18.

THE following Notice, dated the 13th February, 1918, has been issued by the Board:—

Information as to Government Orders Affecting Agriculture to be Given in Plain Language.

The War Emergency Committee of the Royal Agricultural Society of England, at their meeting held on 5th February, 1918, recommended that all Government Orders dealing with matters affecting agriculture should be conveyed to farmers in plainest language, and a summary printed and distributed in leaflet form. This recommendation has already been anticipated by the Board of Agriculture and the Ministry of Food, and these Departments have recently set up a Joint Committee to distribute amongst farmers information about Government Orders affecting their industry and other matters of a kindred nature.

The Secretary of this Committee is Mr. Nugent Harris, and all communications respecting it should be addressed to him at 4, Sanctuary, Westminster, S.W. 1.

Electro-Culture Committee.

THE President of the Board of Agriculture and Fisheries has appointed a Committee to advise in regard to all electrical questions in connection with the carrying out of experiments in electro-culture and particularly in regard to the construction of apparatus suitable for use on an economic scale, and to the making of such electrical measurements as may be necessary in connection with the experiments

The Committee is constituted as follows:—

Sir John Snell, M.Inst.C.E. (*Chairman*).
Mr. A. B. Bruce, M.A.
Professor V. H. Blackman, F.R.S.
Dr. Chree, F.R.S.
Mr. W. R. Cooper, M.A., B.Sc., A.I.C.
Dr. W. H. Eccles, M.I.E.E.
Mr. J. S. Highfield, M.I.E.E.
Professor T. Mather, F.R.S., M.I.E.E.
Dr. E. J. Russell, F.R.S.
Mr. C. T. R. Wilson, F.R.S.

Mr. B. W. Phillips, of the Board of Agriculture and Fisheries, will act as Secretary to the Committee, and all communications should be addressed to him at 4, Whitehall Place, S.W. 1.

Grain Prices for 1918 Crops.

THE Food Controller has, in conjunction with the Board of Agriculture and Fisheries, the Board of Agriculture for Scotland, and the Department of Agriculture and Technical Instruction for Ireland, agreed that the prices of corn harvested in 1918 shall be fixed on a basis somewhat similar to that adopted in 1917. The maximum prices for wheat and rye will be based on an average price of 75*s*. per qr. of 504 lb. Barley will be based on an average price of 65*s*. per qr. of 448 lb. Oats will be based on an average price of 46*s*. 3*d*. per qr. of 336 lb., and an addition to the price of oats will be allowed for the better classes sold for milling purposes. (*National Food Journal*, 13th February, 1918.)

Potassium Compounds for Fertilisers: Notice of General Licence for Purchase.

THE Controller of Potash Production has given notice as follows:—

1. As from the date hereof (8th February) until 31st May, 1918, he hereby licenses the purchase by any person of any potassium compounds to which the Order of the Minister of Munitions, dated the 17th October, 1917, relates, provided that the compounds so purchased are used wholly by the purchaser for direct and immediate application as a fertiliser to the flax crop in Ireland and to no other crop, and provided that they are purchased from or through an agent prescribed for that purpose by the Department of Agriculture and Technical Instruction for Ireland.

2. As from the date hereof until further notice he hereby licenses the purchase by any person of any potassium compounds to which the said Order relates, in quantities not exceeding in weight an aggregate of three tons during any one calendar month, provided that the compounds so purchased are used wholly by the purchaser for direct and immediate application to the ground as a fertiliser. (*Board of Trade Journal*, 14th February, 1918.)

Blast-Furnace Dust for Fertilisers: Notice of General Licence for Purchase.

THE Controller of Potash Production has also given notice as follows:—

1. As from the date hereof (8th February) until 31st May, 1918, he hereby licenses the purchase by any person of any blast-furnace dusts to which the Order of the Minister of Munitions, dated the 7th August, 1917, relates, containing potash to an amount exceeding 13 per cent., expressed as potassium oxide (K_2O), provided that the blast-furnace dusts so purchased are used wholly by the purchaser for direct and immediate application as a fertiliser to the flax crop in Ireland and to no other crop, and provided that they are purchased from or through an agent prescribed for that purpose by the Department of Agriculture and Technical Instruction for Ireland and licensed so to sell by the Controller of Potash Production.

2. As from the date hereof until further notice he hereby licenses the purchase by any person of any blast-furnace dusts to which the said Order relates containing potash to an amount of 13 per cent. or less, expressed as potassium oxide (K_2O), provided that the blast-furnace dusts so purchased are used wholly by the purchaser for direct and immediate application to the ground as a fertiliser, and provided that they are purchased from a person licensed so to sell by the Controller of Potash Production. (*Board of Trade Journal*, 14th February, 1918.)

Prosecutions of Farmers under Statutory Rules and Orders.

TAMWORTH.—William Peace, Elford, was fined £100 on an attempt to get barley ground by grist millers though it was fit for human food.

HALSTEAD (Essex).—Mr. Alfred Bloomfield, J.P., a member of the Control Committee, was fined £25 and £5 costs for feeding pigs with barley. A teetotaler, the defendant resented the fact that barley may be sold to brewers at a higher price than to millers.

CONWAY.—Joseph Parr, Deganwy Quay, was fined £25 with £5 costs for selling unsieved potatoes.

GODSTONE.—Thomas Scott, Warlingham, was fined £10 for selling for slaughter a beast that was not on the market, and George Vernon Crouch, butcher, £50 for buying and slaughtering the beast.

NORTH LONDON.—Harriet Toby, Lower Clapton Road, was fined £20, with five guineas costs, for selling potatoes without a certificate authorising her to do so.

ELY.—William Able Towler, Littleport, prosecuted by an Assistant Commissioner for the Eastern Division, was fined £75 on each of two cases—with costs £155 in all—for selling to a Birmingham merchant as sound marketable ware potatoes a mixed consignment.

BRIERLEY HILL.—Leonard Leek, farmer, Kingswinford, for illicit profits on sales of potatoes, was fined £20. William Hughes, dealer, for a similar offence was fined £10. (*National Food Jouranl*, 13th February, 1918)

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for January, 1918, issued by the International Institute of Agriculture, contains estimates of the production of cereal crops in the Northern Hemisphere. The countries in respect of which it is possible to give forecasts are as follows :—In *Europe*—Denmark, Spain, France, Great Britain, Ireland, Italy, Luxemburg, Norway, Netherlands, Sweden, Switzerland ; in *America*—Canada, United States ; in *Asia*—British India, Japan ; in *Africa*—Algeria, Egypt, Tunis.

Wheat.—The total production in the above-mentioned countries is estimated to amount to 232,948,000 qr. in 1917, against 242,379,000 qr. in 1916, a decrease of 3·9 per cent., while the area sown was smaller by 5·2 per cent.

Rye.—In the above-mentioned countries in Europe and America, except Great Britain, the yield is placed at 18,685,000 qr. in 1917, against 19,396,000 qr. in 1916, a decrease of 3·7 per cent., but the area sown was larger by 7·1 per cent.

Barley.—The production in the specified countries, excluding British India, is estimated at 73,263,000 qr. in 1917, against 73,122,000 qr. in 1916, or an increase of 0·2 per cent., the area sown being greater by 6·3 per cent.

Oats.—The total yield in the specified countries, with the exception of British India, Japan, and Egypt, is placed at 280,085,000 qr. in 1917, or an increase of 12·1 per cent compared with 1916, when it amounted to 249,894,000 qr., while the area sown showed an increase of 8·7 per cent.

Maize.—The total production in Spain, Italy, Switzerland, Canada, United States and Japan is estimated to amount to 383,001,000 qr. in 1917, against 315,371,000 qr. in 1916, an increase of 21·4 per cent., the area sown being greater by 12·3 per cent.

France.—According to an estimate issued by the Minister of Agriculture, the total production of the following crops last year was as follows:—Wheat, 3,923,141 tons; barley, 861,261 tons; oats, 3,446,257 tons; rye, 698,770 tons; buckwheat, 427,282 tons; maize, 411,876 tons, and potatoes, 10,922,680 tons. (*London Grain, Seed and Oil Reporter*, 24th January, 1918.)

According to the official returns, the area sown with wheat and rye or under cultivation for these crops, on 1st January, was (figures for 1917 in brackets):—Wheat, 11,329,988 acres (10,564,165), and rye, 1,954,412 acres (2,044,765). The condition of the crops was as follows:—Wheat, 59 (61); rye, 68 (69); barley, 71 (67), and oats, 70 (70), (80 = good, 60 = fairly good, 50 = passable). (*London Grain, Seed and Oil Reporter*, 31st January, 1918.)

Canada.—According to a report issued by the Census and Statistics Office at Ottawa, the total production of wheat in 1917 was 233,742,850 bush. from 14,755,850 acres; oats, 403,009,800 bush. from 13,313,400 acres; and barley, 55,057,750 bush. from 2,392,200 acres.

Chili.—The United States Consul-General at Valparaiso confirms that crop prospects in Chili are good, and the area of wheat in the central district is said to be one-third greater than in former years. Reports from some districts state that a very good crop is expected, and owing to the recent rains the growing crop is in excellent condition. (*Broomhall's Corn Trade News*, 2nd February, 1918.)

India.—The first general forecast of the area sown with wheat in 1917-18 is 33,912,000 acres compared with 30,924,000 acres, the first estimate for 1916-17. The favourable rains which have recently fallen make the outlook for the coming harvest very bright. (*Broomhall's Corn Trade News*, 4th February, 1918.)

Agricultural Conditions in England and Wales on 1st February.

THE Crop Reporters of the Board, in reporting on the agricultural position on 1st February, state that the hard frosts which prevailed over most of the country during the first half of January appear to have done little harm to the crops. Wheat is everywhere looking well, especially the early sown, but the later wheat is backward. Oats and beans are also mostly satisfactory, though the latter is sometimes backward, a thin plant in the east. The severe weather and snow stopped field work generally at first, but good progress could be made towards the end of the month, and cultivation is generally well forward for the time of year.

Ewes are healthy and in fairly satisfactory condition, and prospects for the lambing season are quite favourable. The fall of lambs in the early flocks of Dorset and neighbouring counties is up to the average in number, and not many losses are reported.

Live stock are generally healthy, but fattening and other stock are reported to have made comparatively slow progress, owing partly to the severe weather and partly to the shortage of artificial feeding stuffs. In most parts of the country there is thought to be sufficient winter-keep (apart from artificials) for the remainder of the season; but some districts in the east are rather short.

There is still scarcity of labour, especially the skilled sort, but with extraneous assistance the work has not fallen into arrears.

The following local summaries give further details regarding agricultural labour in the different districts of England and Wales:—

Agricultural Labour in England and Wales during January.

Northumberland, Durham, Cumberland, and Westmorland.—The position as regards labour is much the same as a month ago, skilled labour is scarce, but work is well forward.

Lancashire and Cheshire.—Labour is generally short, especially skilled men, but the deficiency is being made good by the employment of women and soldiers.

Yorkshire.—Skilled labour is generally deficient. The better distribution of labour and increased employment of women and soldiers have cause a slight improvement in the situation.

Shropshire and Stafford.—Although the supply of skilled labour is short, the position does not appear serious at present. Soldiers and women are rendering good assistance.

Derby, Nottingham, Leicester, and Rutland.—The supply of labour, especially skilled, is very short, but the situation is relieved by soldiers and women assisting.

Lincoln and Norfolk.—The supply is deficient, especially of skilled men, but, with the assistance of soldiers and women, farmers have been able to get the necessary work done

Suffolk, Cambridge, and Huntingdon.—With so little field work possible, the shortage in the supply of labour, which is much the same as a month ago, has not yet been felt to any great extent during January.

Bedford, Northampton, and Warwick.—Labour, though scarce, is about sufficient for this time of the year.

Buckingham, Oxford, and Berkshire.—Though labour is scarce, there is generally about enough for the present needs.

Worcester, Hereford, and Gloucester.—The supply of labour is for the most part short, but, with the assistance of women and soldiers, the urgent work has been dealt with.

Cornwall, Devon, and Somerset.—The supply of labour is short, but much assistance has been rendered by soldiers and women.

Dorset, Wiltshire, and Hampshire.—The supply of labour is still short, but the deficiency has been met by the employment of women and soldiers.

Surrey, Kent, and Sussex.—The supply of labour, especially skilled, is still short, but the deficiency has to a certain extent been made good by the employment of women and soldiers.

Essex, Hertford, and Middlesex.—The supply of labour is still deficient, but, with soldiers and German prisoners assisting, the position appears no worse than a month ago.

North Wales.—The supply of labour is still short, but farmers are getting through the work with the aid of soldiers and women.

Mid Wales.—There is a short supply of local labour, but the deficiency is nearly made up by the soldiers who have been released for the ploughing season.

South Wales.—The supply of labour is generally deficient, especially experienced men, but much help is rendered by soldiers and women.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st February, 1918, certain diseases of animals existed in the countries specified :—

Austria (on the 2nd January).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of November).—Anthrax, Swine Fever.

France (for the period 16th December—5th January).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-scab, Swine Erysipelas, Swine Fever.

Germany (for the period 1st—15th January).—Foot-and-Mouth Disease, Glanders and Farcy, Swine Fever.

Holland (month of December).—Anthrax, Foot-rot, Swine Erysipelas.

Hungary (on the 2nd January).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (for the period 31st December—6th January).—Anthrax, Black-leg, Foot-and-Mouth Disease (1,987 outbreaks), Glanders and Farcy, Rabies, Sheep-scab, Swine Fever, Tuberculosis.

Norway (month of December).—Black-leg, Swine Fever.

Sweden (month of November).—Anthrax, Black-leg, Swine Fever.

Switzerland (for the period 10th—16th December).—Black-leg, Swine Fever.

No further returns have been received in respect of the following countries : Belgium, Bulgaria, Montenegro, Rumania, Russia, Serbia, Spain.

AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of January, 1916, 1917, and 1918.

—	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
London ...	58	2	76	1	74	4	47	0	65	0	59	2	33	3	47	5	54	2
Norwich ...	55	6	74	1	70	10	48	6	63	11	57	3	32	7	47	3	47	8
Peterborough	56	6	74	10	70	11	48	3	64	0	58	9	32	2	47	0	44	0
Lincoln ...	57	3	76	8	71	2	49	8	66	6	58	10	31	9	48	1	52	1
Doncaster ...	57	4	75	8	70	10	49	3	65	10	58	2	31	8	47	4	42	0
Salisbury ...	56	6	75	2	70	10	50	2	64	10	58	9	33	2	46	8	47	4

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan. 5 ...	55	8	76	0	71	2	47	8	66	4	58	0	31	5	47	1	45	5
,, 12 ...	56	7	75	8	71	2	48	6	65	7	58	2	31	11	47	2	46	9
,, 19 ...	57	2	75	8	71	3	49	6	64	9	58	1	32	6	47	4	47	9
,, 26 ...	58	0	75	10	71	1	51	0	64	5	58	7	32	11	47	8	48	2
Feb. 2 ...	58	3	75	10	71	2	52	5	64	0	58	10	32	4	47	3	50	2
,, 9 ...	57	6	76	0	72	0	52	10	63	5	59	0	32	2	46	11	50	6
,, 16 ...	56	11	76	3	72	3	53	6	63	8	58	11	31	9	47	3	52	0
,, 23 ...	58	2	76	9			54	2	63	9			32	2	47	8		
Mar. 2 ...	59	4	77	4			55	7	64	0			32	4	48	0		
,, 9 ...	58	2	78	0			55	6	63	7			32	3	48	7		
,, 16 ...	57	9	78	10			55	4	64	1			31	10	49	4		
,, 23 ...	55	11	80	3			54	6	65	6			31	4	50	4		
,, 30 ...	53	6	81	5			53	8	71	10			30	5	51	10		
Apl. 6 ...	51	8	84	4			53	7	69	11			30	1	55	1		
,, 13 ...	53	2	85	2			53	1	71	10			30	7	57	2		
,, 20 ...	55	3	84	10			52	10	70	6			31	8	59	8		
,, 27 ...	56	3	81	1			53	5	69	5			32	4	58	6		
May 4 ...	55	7	77	7			53	1	64	4			32	10	54	9		
,, 11 ...	55	5	78	0			53	5	64	11			33	1	55	2		
,, 18 ...	55	0	77	11			52	10	64	10			33	0	55	2		
,, 25 ...	54	7	78	0			52	9	64	9			33	4	54	11		
June 1 ...	53	3	78	0			53	9	65	11			33	3	54	11		
,, 8 ...	51	2	78	0			52	8	67	7			32	7	55	0		
,, 15 ...	48	10	78	2			50	9	75	6			32	1	55	1		
,, 22 ...	47	6	78	1			49	10	75	0			31	3	55	2		
,, 29 ...	46	3	78	3			49	1	73	11			30	10	55	1		
July 6 ...	46	3	78	1			45	6	69	5			30	8	55	2		
,, 13 ...	48	11	78	2			47	5	70	10			31	6	55	1		
,, 20 ...	51	6	78	3			48	8	72	1			32	3	55	2		
,, 27 ...	53	5	78	3			47	2	65	7			32	5	55	2		
Aug. 3 ...	55	1	78	2			46	1	73	6			32	9	55	0		
,, 10 ...	56	7	78	4			46	11	76	1			31	2	55	0		
,, 17 ...	58	1	78	7			48	0	68	11			30	8	55	6		
,, 24 ...	59	0	76	7			47	1	70	7			31	6	54	7		
,, 31 ...	59	4	72	1			48	5	60	4			30	5	49	0		
Sept. 7 ...	59	3	71	6			51	7	59	3			31	1	46	7		
,, 14 ...	59	11	70	7			52	6	57	2			30	9	45	0		
,, 21 ...	59	4	70	8			53	3	56	10			30	9	45	8		
,, 28 ...	58	10	70	6			54	1	58	5			31	1	44	7		
Oct. 5 ...	59	2	70	8			54	5	57	9			30	9	44	9		
,, 12 ...	59	7	71	0			53	10	58	5			31	6	44	5		
,, 19 ...	60	9	70	8			53	8	59	3			31	11	44	1		
,, 26 ...	62	10	70	10			54	6	60	1			32	10	43	0		
Nov. 2 ...	66	7	70	4			56	2	59	11			34	0	42	4		
,, 9 ...	69	8	70	3			58	0	60	2			35	8	42	11		
,, 16 ...	70	9	70	3			59	8	60	2			37	8	43	0		
,, 23 ...	70	8	70	2			61	8	59	9			39	7	43	1		
,, 30 ...	71	3	70	2			63	1	59	3			41	4	44	6		
Dec. 7 ...	72	1	70	7			65	6	58	7			44	1	43	5		
,, 14 ...	73	2	71	2			66	5	58	0			45	10	43	6		
,, 21 ...	74	8	71	1			67	3	57	7			46	5	44	2		
,, 28 ...	75	10	71	1			67	5	57	7			47	4	44	10		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in January, 1918, and December, 1917.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	JANUARY.		DECEMBER.	
	First Grade.	Second Grade.	First Quality.	Second Quality.
	per cwt. live weight.	per cwt. live weight.	per stone.*	per stone.*
FAT STOCK :—				
Cattle :—	s. d.	s. d.	s. d.	s. d.
Polled Scots	75 0	70 0	21 7	20 3
Herefords	75 0	70 0	19 8	18 2
Shorthorns	75 0	70 0	19 8	18 2
Devons	75 0	70 0	19 4	17 9
Welsh Runts	75 0	70 0	20 0	19 4
Fat Cows	70 0	62 0	—	—
	First Quality. per lb.*	Second Quality. per lb.*	per lb.*	per lb.*
	d.	d.	d.	d.
Veal Calves	17¼	15½	16½	14¾
Sheep :—				
Downs	18	17¼	17¾	16¼
Longwools	17¾	17	17¼	16
Cheviots	18½	17¼	18¼	17
Blackfaced	17½	16¾	17¼	15¾
Welsh	17¾	16¾	17	15¾
Cross-breds	18	17¼	17¾	16¼
	per score. live weight.	per score live weight	per score live weight	per score. live weight
Pigs :—	s. d	s. d.	s. d.	s. d.
Bacon Pigs	18 0	18 0	18 0	18 0
Porkers	18 0	18 0	18 0	18 0
LEAN STOCK :—	per head.	per head	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	55 0	43 9	55 14	44 4
,, —Calvers ...	51 4	41 0	49 15	39 16
Other Breeds—In Milk ...	50 6	38 3	54 12	43 14
,, —Calvers ...	—	—	33 0	30 0
Calves for Rearing	4 0	3 2	4 6	3 6
Store Cattle :—				
Shorthorns—Yearlings ...	17 9	15 2	17 11	14 18
,, —Two-year-olds...	27 3	22 18	27 10	23 4
,, —Three-year-olds	35 3	31 1	36 14	31 5
Herefords —Two-year-olds .	29 6	25 0	29 18	25 4
Devons— ,,	26 7	22 12	28 6	23 18
Welsh Runts – ,,	27 3	22 13	26 5	23 10
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	72 0	59 4	69 9	57 0
Store Pigs :—				
8 to 12 weeks old	32 5	24 7	35 0	26 0
12 to 16 ,, ,, ...	55 3	40 8	58 11	44 7

* Estimated carcass weight.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in January, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d	per cwt. s. d.
BEEF:—						
English	1st	116 6	116 6	—	116 6	116 6
	2nd	116 6	116 6	—	116 6	116 6
Cow and Bull	1st	116 6	116 6	116 6	116 6	116 6
	2nd	115 0	115 6	111 0	112 0	115 0
Irish: Port Killed	1st	116 6	116 6	116 6	116 6	116 6
	2nd	116 6	115 6	115 6	116 6	115 6
Argentine Frozen—						
Hind Quarters ...	1st	107 6	—	107 6	107 6	107 6
Fore ,, ...	1st	88 6	—	88 6	88 6	88 6
Argentine Chilled—						
Hind Quarters	1st	107 6	107 6	107 6	107 6	107 6
Fore ,, ...	1st	88 6	88 6	88 6	88 6	88 6
American Frozen—						
Hind Quarters	1st	—	—	—	107 6	—
Fore ,, ...	1st	—	—	—	88 6	—
VEAL:—						
British	1st	112 0	115 0	116 6	115 6	—
	2nd	112 0	109 6	109 6	115 6	—
Foreign...	1st	—	—	—	—	—
MUTTON:—						
Scotch	1st	124 0	125 0	124 0	125 0	124 0
	2nd	124 0	123 6	124 0	—	124 0
English...	1st	124 6	125 0	—	125 0	124 0
	2nd	124 6	123 6	—	125 0	124 0
Irish: Port Killed	1st	125 6	—	124 0	125 0	124 0
	2nd	125 6	—	124 0	125 0	120 6
Argentine Frozen	1st	107 6	107 6	107 6	107 6	107 6
New Zealand ,, ...	1st	107 6	—	—	—	—
Australian ,, ...	1st	107 6	—		—	—
LAMB:—						
British	1st	—	—	—	—	—
	2nd	—	—	—	—	—
New Zealand	1st	107 6	—	—	107 6	—
Australian	1st	—	—	—	107 6	—
Argentine	1st	107 6	107 6	107 6	107 6	107 6
PORK:—						
British	1st	133 0	133 0	—	133 0	—
	2nd	133 0	—	—	133 0	—
Frozen	1st	—	—	—	—	—

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in January, 1918.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	28 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	237 0	—	—	—
" Factory	—	—	233 0	—	—	—
Imported (Controlled)	252 0	252 0	252 0	252 0	252 0	252 0
CHEESE :—						
British—						
Cheddar	152 0	—	—	—	152 0	—
			120 lb.	120 lb.	120 lb.	120 lb.
Cheshire	—	—	160 0	—	162 6	—
			per cwt.	per cwt.	per cwt.	per cwt
Canadian	130 6	—	130 6	—	130 6	—
BACON :—						
Irish (Green)	182 0	—	181 0	—	182 0	—
Canadian (Green sides)	—	—	—	—	178 0	177 0
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	170 6	—	170 0	—	171 0	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120	per 120
British	—	—	—	—	45 0	41 0
Irish	38 7	—	38 8	37 10	41 0	38 0
Canadian	29 4	—	28 8	27 8	30 5	28 7
American	27 4	—	25 1	24 1	28 2	26 5
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	155 0	142 0	126 6	121 6	149 0	140 0
Edward VII.	154 0	141 6	131 6	126 6	144 6	134 0
Up-to-Date	149 6	135 0	126 6	118 6	—	—
HAY :—						
Clover	—	—	—	—	147 0	139 6
Meadow	—	—	—	—	147 0	139 6

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(*From the Returns of the Board of Agriculture and Fisheries.*)

DISEASE.	JANUARY.	
	1918.	1917.
Anthrax:—		
Outbreaks	30	56
Animals attacked	33	60
Foot-and-Mouth Disease:—		
Outbreaks	—	—
Animals attacked	—	—
Glanders (including Farcy):—		
Outbreaks...	2	3
Animals attacked	3	3
Parasitic Mange:—		
Outbreaks	587	333
Animals attacked	1,172	708
Sheep-Scab.—		
Outbreaks	94	141
Swine Fever:—		
Outbreaks	71	159
Swine slaughtered as diseased or exposed to infection	24	63

IRELAND.

(*From the Returns of the Department of Agriculture and Technical Instruction for Ireland.*)

DISEASE.	JANUARY.	
	1918.	1917.
Anthrax:—		
Outbreaks	—	1
Animals attacked	—	1
Foot-and-Mouth Disease:—		
Outbreaks	—	—
Animals attacked	—	—
Glanders (including Farcy):—		
Outbreaks	—	—
Animals attacked	—	—
Parasitic Mange:—		
Outbreaks	14	5
Sheep-Scab:—		
Outbreaks	50	67
Swine Fever:		
Outbreaks	1	12
Swine slaughtered as diseased or exposed to infection	1	66

The Weather in England during January.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm *		Hours.	Hours.
Week ending 5th Jan.:								
England, N.E. ...	36·1	−1·8	0·24	6	− 7	4	0·8	−0·3
England, E.	33·6	−4·1	0·08	2	−11	3	1·4	0·0
Midland Counties ...	34·3	−3·4	0·06	2	−13	2	1·0	−0·1
England, S.E. ...	33·4	−6·1	0·07	2	−12	2	1·5	0·0
England, N.W. ...	37·0	−2·3	0·05	1	−18	2	1·4	+0·4
England, S.W. ...	34·1	−7·2	0·04	1	−22	1	2·1	+0·6
English Channel ...	37·4	−7·3	0·15	4	−16	2	1·9	0·0
Week ending 12th Jan.:								
England, N.E. ...	32·9	−4·8	0·40	10	0	4	1·6	+0·6
England, E.	33·0	−4·1	0·30	8	− 2	4	1·7	+0·1
Midland Counties ..	33·6	−3·4	0·22	6	− 5	5	1·6	+0·3
England, S.E. ..	34·8	−3·9	0·25	6	− 6	3	1·5	−0·1
England, N.W. ..	35·4	−3·6	0·65	16	+ 1	6	1·3	+0·1
England, S.W. ...	36·6	−3·7	0·50	13	− 6	5	1·4	−0·2
English Channel ...	40·2	−3·6	0·59	15	− 3	7	1·9	0·0
Week ending 19th Jan.:								
England, N.E. ...	32·1	−6·1	1·16	29	+21	5	1·7	+0·3
England, E.	36·1	−1·6	1·97	50	+41	6	1·3	−0·1
Midland Counties ..	35·6	−2·3	1·83	46	+36	6	1·0	−0·3
England, S.E.	39·5	+0·1	2·79	71	+59	7	1·2	−0·4
England, N.W.	35·6	−3·9	1·49	38	+22	5	1·2	0·2
England, S.W. .	40·4	−0·5	3·41	86	+68	7	1·3	−0·3
English Channel ..	46·0	+1·8	1·33	34	+20	6	2·3	+0·3
Week ending 26th Jan.:								
England, N.E. ...	46·6	+8·2	0·52	13	+ 4	4	1·2	−0·5
England, E.	46·6	+8·4	0·16	4	− 5	4	1·6	−0·5
Midland Counties ..	48·3	+9·9	0·27	7	− 5	3	1·0	−0·6
England, S.E. ...	47·1	+7·5	0·37	9	− 3	4	1·8	−0·1
England, N.W. ...	48·5	+8·8	0·74	19	+ 1	5	0·8	−0·8
England, S.W. ..	48·2	+7·0	0·53	14	− 7	5	0·9	−0·9
English Channel ...	48·5	+4·3	0·22	6	−10	4	2·3	0·0

* 1 inch = 2·54 centimetres.

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IMPROVISED METHODS OF MAKING SILAGE.

In view of the importance of growing and preserving as great a quantity of forage as possible for cattle food during next winter, it is desirable that none of the possible methods of preserving such forage should be overlooked. Ensilage is one of these methods, and the purpose of this article is to examine how far it may be possible and economical to bring this process into greater favour with farmers.

It is generally recognised, and rightly so, that, when dry, sunny weather prevails at hay time, meadow grass as well as clover and other seeds mixtures can be converted into hay economically, and that the fodder as hay will retain a greater food value than if stored as silage, because in the latter case the wastage, both at the outsides of the silo or stack, and in the fermentation of the material, will be considerably greater in the case of silage; but in wet, showery weather, especially in the case of the second crops of clovers or of grass, the waste of time in trying to make the hay and the loss of food material in the washing of the crop are great. Both, however, may be largely avoided by ensilage, which is much less dependent upon fine weather for success than is hay-making. During last autumn many hundreds of tons of late second-cut seeds and of autumn grass were wasted in the effort to make hay in the unfavourable weather prevailing; this might have been secured as silage if the attempt had been made.

Again, in those districts and upon those soils where roots can be easily grown, and where sufficient labour for hoeing is available, it is certain that the root crop provides both the cheapest and the greatest return of cattle food upon the fallow tilth; but other soils and districts are not so suitable to roots, failures are common and costs of production are high. In these cases it is well to consider whether a silage crop such as oats and tares can be grown more economically. Such a crop can be grown both on very heavy and on very light soils ; in the former case it should be followed by a half fallow, the crop being cleared in early July; in the latter case a successful catch crop of white turnips, rape or mustard can often be taken afterwards. Where such a silage crop is grown, it is generally best to sow in autumn, but a spring-sown crop may also produce good results ; unfortunately at the present time the seeding of the crop is expensive.

A third possibility is to grow a permanent crop of lucerne and Italian rye-grass for a period of 4 or 5 years ; the cost of seed and cultivation for this crop, if spread over the period of its life, is very small, and, if the crop is cut as it comes into flower and at its prime, 3 crops can be taken each year. It is a useful crop for silage on soils which favour lucerne.

Lastly, maize in the warmer districts and on early soils is successfully grown and made into silage by some English farmers ; in America it is almost universally grown for this purpose. Unfortunately, the maize does not ripen so quickly in England as in America, and rarely reaches the stage of ripeness that is considered best for silage by American farmers. For this reason maize as grown in England is too moist and sappy when cut, and often produces very " sour " silage. Some growers, in order to counteract this tendency, mix second-cut clover or lucerne with the maize and so obtain a silage which is " sweet " and has good feeding properties. In the 'eighties, when silage was a prominent feature in English farming, straw chaff was occasionally mixed with maize, when the silo was filled, for the purpose of absorbing some of the moisture and keeping the silage from becoming so " sour." If this is done, not more than $\frac{1}{10}$th part by weight of straw should be added, or the silage may be spoilt by becoming too dry.

The Principles of Making Silage.—It is commonly imagined by the novice that very little care and skill are required in making silage, and, as a result, the silage may be wholly or partially spoilt. Certain principles must be recognised in order to obtain a good product. If these principles are known and followed, then the practice of making silage is not a difficult one, and may commend itself to many farmers, especially those farming on a large scale, because it can be carried through with a swing and is not subject to such irritating delays as haymaking in showery weather. Briefly the principles involved in making silage are as given below.

Cutting the Crop.—The crop should be cut for silage at about the same time as similar crops are cut for hay, *i.e.*, just after the plants are in full flower. It is best not to cut the crop too young; it is then too sappy, settles too quickly and tightly in the heap, does not heat, and is likely to be very "sour." Again, the crop should not be allowed to get too old, because in that case, although good silage can be made, much of the plant food has become fibrous and indigestible, and, despite many statements to the contrary, ensilage does not convert indigestible fibre into a digestible food. The oat and tare crop should be cut when the oats are in milk and the tare seeds begin to dent the pods. Maize can never get too ripe in England; it should be allowed to grow until frosts are imminent, and even after a light frost can still be made into silage.

Time to Cart.—If the silage is being made in tall tower silos or in deep pits, with a comparatively small cross-section, in which, therefore, the height of silage rises quickly and the pressure rapidly increases on the lower layers so as to squeeze out air, it is preferable to allow a sappy crop to dry for 24 hours, or even longer, in the field before carting, though this is not essential. On the other hand, if silage is being made in clamps or stacks, which have a greater cross-section, and in consequence the height rises more slowly, it is preferable to cart and make the silage within a few hours of cutting unless the crop is very sappy.

Walls of Silo.—The walls of the silo should be as nearly as possible vertical, and should have a smooth interior surface so that the silage can easily settle by the side of them. If a silo is rectangular, the angles to a depth of 6 in. should be built up, since otherwise the silage cannot be tightly packed into them, and the air, entering, will cause the silage to become mouldy. In the same way when silage clamps or stacks are made they should be built with vertical sides.

Protection of Silo.—In making silage, provision should be made to prevent water from draining into the silo from below or running into the silage as rain from above. Simple earthen pits for silage must not be placed where water is liable to drain into them. If stacks or clamps of silage are made in mid-summer it is advisable to locate them in the shade of trees to protect the outside and roof from excessive drying. It is equally important after the silage is made to exclude air, since access of air causes the silage to become mouldy.

Chaffing.—When silage is made in tall towers or in pits the fodder is usually chaffed; for clamps and stacks the fodder is always made into silage unchaffed.

Filling the Silo.—In filling the silo, or building the silage stack, it is important to keep the surface perfectly level; as building proceeds the whole must be kept tight and compact by treading. At the bottom of the silo this treading is not, perhaps, very important, but as the height rises efficient consolidation is very important, and one or two extra hands should be put on to attend to this matter, giving special attention to the sides of the silo, where the silage is likely to cling to the walls and settle irregularly.

Heating.—It is generally agreed that "sweet" silage is preferable to "sour" silage. The former is made when a moderate amount of air is allowed to remain in the silage, so that fermentation is fairly active and the temperature rises; "sour" silage generally results if the material is quickly and heavily weighted so that nearly all the air is immediately squeezed out; in this case fermentation is reduced and the temperature remains low. Generally speaking, if the temperature is kept below 120° Fahrenheit, "sour" silage will result, but if the temperature exceeds 120° Fahrenheit "sweet" silage will be produced. It is, however, not good practice to allow the fermentation to proceed too rapidly and the temperature to rise too high, because during fermentation sugar, starch and other readily digestible products are burnt up and lost. The ideal to aim at is to produce silage which will be "sweet" and yet will not have heated to an unnecessary high temperature, *i.e.*, not above 150° Fahrenheit.

Two factors enable the farmer to control the fermentation:—(1) The dryness or wetness of the crop when carted; if the crop is comparatively dry it does not pack so tightly and consequently retains more air. (2) The rate of making the silage: if the heap rises rapidly the pressure on the lower layers rapidly increases and the air is squeezed out, and, *vice versa*, if the heap is put together slowly, the pressure is less, and more air is retained for fermentation. By adjusting the state of dryness of the crop and the rate of making, the farmer is able to control the heating of his silage.

Pressure.—The previous paragraph explains how pressure is related to heating in the silo. As the height rises the pressure on the lower layers automatically increases so that the air spaces are reduced to a minimum, and no more air can gain access. The same conditions, however, do not prevail at the top of the silo, where there is likely to be considerable loss by moulding and rotting unless special precautions are taken. In the first place the last few feet of the heap should be composed of as green and succulent material as possible; these are sure to get heat enough, and the extra moisture helps to seal the top; in some cases, if the fodder has become dry, it may be well to add water. Upon the top of the good fodder it is well to put rough grass brushings, nettles or other succulent material, since a few inches of silage on the surface will inevitably be mouldy. When this covering is in place the whole should be well trodden, and treading should be repeated at intervals of a couple of days for a few weeks after filling is complete. In one case where this method was practised last season the depth of spoilt material only amounted to 4 in. or 5 in.; in another case where subsequent treading was omitted the depth of spoilt material was fully 1 ft. In the case of tall tower silos the top is frequently not weighed, but in the case of clamps, stacks or shallow pits the top should be weighted or pressed at the rate of up to 100 lb. per sq. ft. by special silage presses, by boxes full of earth or old iron, by boards specially loaded, or in some cases by earth alone thrown on the top of the heap.

VARIOUS METHODS OF MAKING SILAGE.

1. **The Tall Tower Silo.**—The modern tower silo, built of wood or reinforced concrete, is the commonest form of silo in America at the present time, and during the last few years a number of such tall silos have been erected in England, and have generally given satisfaction.

The crop is nearly always chaffed and the silo is filled by the aid of a blower attached to the chaff-cutter and driven by the same power, but good results have been secured from silos filled with long material by means of an ordinary elevator. The blower or fan elevates the chaffed fodder through galvanised iron tubes, 10 to 12 in. in diameter, to the top of and into the silo. The green chaff is spread evenly, and compacted in the silo by treading, special attention being given to the sides. In most cases the green fodder is allowed to dry 24 hours or so before carting. The filling process is usually continued over a period of 5 to 10 days, during which time, owing to fermentation, the sillage settles compactly, especially at the bottom.

Generally, no special care is taken to press the top by added weights, though the top may be covered by grass brushings and other green material of little value. The top of the silage should be trampled at intervals during the first few weeks after filling, but in doing this the workman must be careful to avoid being suffocated; if the silage has fermented and settled below the closed doors, the top of the silo above the silage is often filled with heavy gas (carbonic acid) produced by the fermentation; this gas must first be allowed to escape by opening the doors, the workman being careful to keep his head above the level of the doorway, since the gas will run out downwards as soon as the door is open.

This method of making silage enjoys several advantages. The risk of waste from mouldy silage is very small because, if properly made and well trodden, air is excluded from the sides, and the only waste which occurs is over the comparatively small top surface. The chaffed silage when required is easily thrown out of the silo with a fork, and, if the site for the silo has been well chosen, can be very economically fed to the cattle.

2. **Pit Silos.**—In the 'eighties a large number of pit silos were constructed in various parts of England, but have since fallen out of use; these might again be put to profitable use for making silage.

One of the best patterns of these pit silos was constructed by the late Mr. E. Gibson, of Little Walden, Essex. In this case 5 cubic pits or tanks, made of concrete, were built in a row adjoining the mixing place for the cattle feed; the site of the pits was selected on the high ground adjoining the farmyard, so that underground water would not be likely to percolate towards the pits; 6 or 8 ft. of the clay subsoil were excavated and thrown out on either side of the site; the outside walls and floors were then built of concrete 10 in. thick, and partitions across the pit were built of the same material to divide the whole into 5 equal pits, leaving a 6-ft. by 4-ft. doorway communicating from one pit to the next for convenience in emptying, the pit at one end communicating with the mixing shed. The dimensions of each pit were 12 ft. by 14 ft. in area and 17 ft. high.

After the walls had been completed the excavated earth was thrown against the outside walls on either side for the purpose of increasing their strength and to provide a platform, upon which to stand a chaff-cutter, so that the green crop had only to be elevated some 6 or 8 ft. after chaffing, into the top of the silos; this elevation was carried out by means of a simple inexpensive chain elevator, geared to the engine which operated the chaff-cutter.

A central drain, running across the floor of each pit, was provided to carry off any surplus sap or rain-water which drained from the silage; this is valuable if the forage is wet, but unnecessary if the crops are sufficiently dry when carted. Each silo was covered with a moveable framework, carrying galvanised iron sheeting to act as a roof and shed rain-water, but at the time of filling, and until the silage had settled, this roofing was removed.

Such pit silos should be filled in much the same way as tower silos, with chaffed green crops trodden and compacted tightly; the silage can, however, be built up above the top of the silos and left to settle within the silo. The tops of such silos should in most cases be covered with planks and weighted with stones or bags of soil: in Mr. Gibson's silos the silage was weighted with concrete blocks about 1 ft. square, giving a pressure of about ½ cwt. per sq. ft. of surface. Such weighting and covering reduces the loss on the surface. Silage made in such pits is liable to be "sour," with a strong, unpleasant odour, if made of very succulent green stuff or fodder wet with rain, and, as with the tower silos, the fodder should be allowed to dry somewhat before being carted. Maize silage is particularly liable to be "sour" in these pits unless mixed with some other drier material at the time of filling.

Two disadvantages are associated with pit silage. On the one hand it is difficult to get the silage sufficiently compact in the corners of rectangular pits, and the silage in these places is liable to become mouldy. This drawback can be obviated by building up the angles 6 in. from the corner. The second disadvantage is the difficulty of getting the material out of such sunken silos for feeding, for silage is heavy to carry out on a man's back. This difficulty is sometimes overcome by erecting a small crane and windlass to lift out feeding trolleys, when filled with silage, from the bottom of the pit.

Pits constructed on more primitive lines, by digging out the pit, without building floor or walls, have been tried in the past, but such silos have not generally been successful, firstly, because it is impossible to keep the walls perfectly smooth and vertical, and the result has been much mouldy silage, and, secondly, because subsoil water is so liable to filter into the silage pit and cause trouble. The use of such pits for making silage, especially if they already exist on the farm in the shape of small, dry, disused chalk or gravel pits, may be justified in the effort to save some green crop late in autumn, especially if the walls can be made roughly vertical with timber.

3. **Barn Silos.**—In some cases successful silage has been made by dividing off part of a little-used barn. Such a barn, especially if it has a sunken floor and brick walls, can be converted into a receptacle for silage at comparatively small cost ; the walls of the barn form 3 sides of the silo and a strong wooden or brick partition can be constructed for the fourth side : if of wood, the boards facing the silage should be strong, 2½ to 3 in. thick, fixed vertically, and strongly braced on the outside to resist the pressure of the silage, which will be greatest against the lower part of the wall. The outside walls of the barn may also need extra bracing to resist similar pressure at this level.

Such silos should be filled in the same way as stave or pit silos. The crop should be chaffed and particularly well trodden, because the height in these silos cannot in any case be very great. For the same reason it should be well weighted. There will probably be more wastage than in pits or towers, because the walls cannot be made so perfectly airtight ; but on account of the low initial cost this method is justifiable in times of surplus green crops, whether of grasses, clovers, oats and tares, or maize.

4. **Silage Clamps.**—Silage clamps are sometimes made in the open field in exactly the same manner as draw-up clamps of dung, and with proper precautions provide a cheap method of preserving grass, clover seeds, or oats and tares, but this is not a suitable method for storing green maize silage. In order to achieve success certain precautions must be adopted or very great wastage may result : the writer has seen one clamp this year, which was not properly consolidated and pressed, and in which the loss cannot have been less than 50 per cent. of the original green crop. On the other hand, two other clamps inspected were conspicuously successful. One of these was made by Mr. Stanley Blundell, of Bendish House,

Welwyn. In this case the crop from 20 acres of a good second-cut clover was ensiled at the end of August, during a spell of rainy weather when harvesting and hay-making were impossible. A suitable site was first selected on a gravel soil overlying chalk, where drainage was good; the procedure was to excavate the site 5 yd. by 12 yd. to a depth of about 18 in., the soil being thrown to either side to provide material for covering and pressing the clamp when complete; this was a long job and occupied about 6 or 8 man-days.

When the site was ready, the work of cutting commenced, and an old-fashioned sail-reaper was used, which left the clover in convenient wads for carting; the clover was picked up immediately after being cut and was spread evenly over the clamp; as each load was brought in, the full load was carted up on the clamp so that each layer was tightly pressed. By the end of the first day 30 or 40 tons had been clamped and the height of the clamp had risen 4 or 5 ft. After the first day's work an interval of a day was left in order to allow fermentation to become active; then the work was continued, allowing an interval of one or two days between each clamping. In this way facilities were given for each layer to get well heated before the next carting of green crop, which was often wet with rain; it also enabled the clamp, after heating, to settle down so that the work of carting over the clamp was made easier for the horses.

The clamp was finally completed when it had mounted to such a height that a pair of horses could no longer haul the loaded carts with safety upon the clamp. The ends of the clamp were then cut off with a hay-knife and thrown on top of the clamp, and the surface was gently rounded off so as to be about 18 in. higher in the centre than at either side, this helping to shed rain water. The top of the clamp was well trodden, and after being allowed to settle for a couple of days the earth, excavated from the site, was thrown on the top of the clamp and spread to a depth of 12 or 15 in. over the surface. This operation occupied about 4 man-days.

The result of this primitive method was very satisfactory, the bulk of the silage was good, greatly relished by cows and growing heifers, and the waste was astonishingly small. A layer, perhaps 9 in. deep, of loose material was spoilt on the top and the same thickness had been spoilt at the sides, where air had been enabled to penetrate the clamp, but below the surface of the ground there was no waste at all.

In order to ensure success with this method the following details should be carefully observed: The site must be carefully chosen, so that water does not percolate into the silage; the surface of the soil to a depth of 1 or 2 ft. is then dug out and thrown to the sides, care being taken to make the clamp sufficiently long to enable the horses to draw the loads up to a fair height. Unlike the making in towers and pits, the green crop is not chaffed, and it should not be allowed to get too dry before carting; the large upper surface of the clamp ensures ample heating, and if the material gets too dry it does not pack so tightly at the sides, and the danger of mould penetrating the heap from the sides is greatly increased. The clamp, and especially the sides, must be well trampled, and for this purpose it is well to keep the trace horse at the clamp and lead it as close to the sides of the clamp as possible while waiting for the next load. After the clamping is complete and the ends of the clamp have been cut off and thrown up, it is preferable to cover with nettles or rough grass brushings and then the whole should be covered to a depth of 12-15 in. with the soil thrown out of the bottom, the packing and consolidation will be still further improved, and the wastage reduced on the top, if the earth on top of the clamp is trampled occasionally during the first few weeks after clamping: the value of such trampling is much greater than is generally supposed, the concentration of pressure at one point causing the silage to settle and then the covering of earth is sufficient to keep it down.

5. **Silage Stacks.**—Another primitive method for the storage of silage from such crops as grass, seeds, or oats and tares consists in building the material into a stack. This method is not suitable for preserving chaffed crops, nor for maize. As in the case of clamps, very great losses may result from moulding and rotting unless suitable precautions are taken. A level, firm site must first be selected, preferably in a shady place. The stack should preferably be built in a circular form because it is difficult to get the corners sufficiently tight, and also to reduce the surface of the stack in contact with the air; generally, the diameter of the stack should be about 20 ft. A load or two of grass brushings or other waste material should be spread on the surface of the ground to form the base. The crop after being cut should preferably be allowed to wilt slightly, but it is better to cart it too wet rather than too dry, because in the latter case there is liable to be more waste from mould on the outside. If the stack is a fair size, however, this objection is minimised, and it is worth noting that hay, which has

been cut and left unturned in the swathe for a week or more during showery weather, may be used for the silage stack and makes useful silage. In building the stack it is of great importance to carry up the sides either vertical or sloping slightly to the centre; there must be no spreading outwards or the sides may slip off. To attain this end the surface of the stack should be kept quite level—not highest in the middle—and the outsides must be kept especially well trampled: the centre can practically take care of itself.

When the stack has reached a few feet above ground, during which time the carts will be led over the stack as in making a clamp, further handling of the green crop is best done with the horse-fork, so saving much labour, the forkload being dumped exactly where required. Lifting with an elevator is objectionable when the stack gets high, because it is impossible to compact the stack uniformly, especially at the side next the implement itself. Stacking may go on continuously, or intervals of not more than 3 days may elapse between each day's work, or a few loads only may be put on at similar intervals. If the crop is very wet or sappy such intervals are preferable because they encourage heating, and also because during the heating the stack settles enormously so that building is facilitated. The stack should be built as high as possible: it is certain to settle, and when complete it is preferable to trim the sides with a hay-knife and throw the trimmings on the top. Finally, the surface should be covered with a layer of nettles or grass brushings.

Silage stacks are weighted in a variety of ways. Wibberley* describes a plan by which, after the silage stack is complete, a stack of hay is built on the top. This naturally entails the possibility of making hay and can only be applied to silage stacks made in the early summer. In other cases, when rectangular stacks have been made the pressure may be derived from special silage presses; the stack is finished off as level as possible, 1½-in. or 2-in. boards are laid longitudinally and continuously over the surface and stout beams are laid across and on top of these at intervals of 8 or 10 ft., with their ends projecting beyond the stack. The stack itself will have been built upon similar beams or iron rods; ropes or wire cables are fixed to corresponding beams above and below, and the pressure is exerted either by suitable levers (as in the case of Mr. E. T. Blunt's patent) or by winders. In other cases, planks are laid on the level surface of the stack (whether round or oblong) and then weighted by sacks of stone or earth or barrels full of water, etc. Or, lastly, the pressure may be effected, as in the case of clamps, making the centre 2 or 3 ft. higher to facilitate shedding of rain-water, and covering the surface a foot deep with soil dug around the stack. This method is perhaps as efficient as any, but it takes time to dig and elevate the earth. If, however, the earth is first loosened with the plough, then filled into bags and elevated by the horse-fork, these difficulties are lessened. Finally, from time to time it is well to tread over the surface to help consolidation and to fill up any cracks that occur in the earth.

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* This *Journal*, September, 1916.

The great advantages of the stack and the clamp methods of making silage are that they can be brought into use at a moment's notice in the event of bad hay-making weather, and entail no outlay of capital; at the same time it is important to emphasise the fact that these methods will always entail great waste

STERILITY IN MARES, WITH RECOMMENDATIONS TO BREEDERS OF HEAVY HORSES.

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IT is with great diffidence that we offer suggestions on the management of stallions and brood mares. The condition in which both sexes are shown at our National and County Exhibitions clearly demonstrates the great skill possessed by stud-owners in the art of feeding. Whether this high condition is essential, and whether it is beneficial to the breed of heavy horses, is in our judgment a matter of some dubiety; in any case it is a serious topic for consideration, and well worthy of attention by all concerned, especially the Committees of Heavy Horse Societies.

The following table of actual foal returns for the year 1916 clearly shows that there is room for considerable improvement in regard to the number of foals which should be born, and suggests that under a more careful management of stallions and mares a much greater success might be attained :—

1	2	3	4	5	6	7	8	9	10	11
Stallions	Fillies.	Colts.	Barren.	Slipped.	Born Dead.	Mares Sold.	No Returns	Mare Died in Foal.	Total.	Per Cent.
A & B (2)	46	30	62	13	5	8	4	6	174	57·5
C	25	20	43	4	1	1	—	—	94	53·2
D	10	14	60	3	—	—	9	—	96	28·2
E	27	23	61	7	1	1	—	1	121	48·7
F	13	13	75	2	—	2	—	1	106	27·5
G	27	13	43	4	1	3	1	—	92	48·7
H	36	30	24	6	1	—	7	6	110	72·0
I	11	12	45	—	—	—	—	5	73	38·3
J	13	13	41	—	1	1	—	4	73	39·3
K	13	16	34	2	1	—	4	—	70	45·7
L	26	31	17	7	—	—	4	—	85	75·2
M	13	14	50	6	1	3	4	—	92	37·0
N	21	19	9	1	1	2	23	2	78	56·3
O	33	22	27	3	—	4	1	3	93	65·5
P	21	36	31	8	2	3	7	1	109	62·5
Totals	335	306	622	66	15	28	64	29	1,466	50·4

All the above stallions travelled under the management of societies, and the foal returns were made by the owners of the mares.

We find on summarising the foregoing table of foal returns that 1,466 mares were served by 15 stallions (2 stallions A and B counting as one), producing 664 living foals. These returns were furnished in July and August, 1917.

The average service fee was £2 14*s*. 6*d*.

The average cost per living foal at birth was £5 8*s*. 0½*d*.

The financial loss on barren mares is therefore very heavy, and the waste of time in view of the non-production of young horses is, perhaps, quite as serious, but it is difficult to estimate from a national and monetary point of view.

The column " No returns " can in most cases be taken to mean that the mare was barren.

There is no evidence that the stallion is wholly responsible where there is a low foal percentage; it would seem more probable that the fault should be divided between the stallion and the mares. If a stallion gets even 28 per cent. of foals he establishes the fact that he is fertile, at least under certain conditions. What these conditions are it is not easy to determine. We have investigated one of the cases recorded above in which the returns are unusually low, and we have found no direct indication as to the causes of so much barrenness. Maiden mares successfully carried foals, and maiden mares were barren; regular breeding mares had foals, and regular breeders failed to carry foals. In two instances mares well advanced into their " teens " had foals. It would, therefore, be unjust to say that the sire was a non-foal-getter.

Putting the above in the form of a table we get the following :—

	£	s.	d.
Total service fees of 15 stallions	40	19	6
Average service fee for each of the 15 stallions ..	2	14	7½
Total fees for service of 1,466 mares (by the above 15 stallions)	4,004	0	3
664 foals, each at £2 14*s*. 7½*d*.	1,813	11	0
Therefore there was an actual cash loss to the mare owners using the above stallions of	2,190	9	3

In making suggestions for improved conditions, we do so with a full knowledge of the very many difficulties of the stallion owner, and we trust that he will accept these suggestions not as an attempt to interfere in his business but as an honest endeavour to better existing conditions.

We believe that stallion shows are to a very great extent responsible for the high condition which stallions and colts so frequently acquire. Occasionally one hears the remark made on a rough, well-grown colt shown in ordinary condition that " this is not his day, but when he's filled up he will beat all those now in front of him," proving to a great extent the public demand, as well as that of the judges, for high or " extra " condition.

It is well known that a stallion or a colt has to be fed over a long period to produce this "extra" condition demanded by the show-ring, and in almost every case the food is boiled or cooked and is intensely rich in nutritive ingredients which, being readily absorbed, promote an undue formation of fat.

It is known that an excessive quantity of nutriment is prejudicial to the proper discharge of the reproductive functions. Very fat animals do not come "in season" with the same regularity as animals whose condition is normal, and are often partially or completely sterile. It has been shown that in some cases certain of the reproductive tissues become the repositories of fatty substances, and undergo a partial degeneration. Unless, however, the process has been allowed to proceed very far, the animals concerned may generally be restored to a condition of normality by restriction of diet and increased exercise, but until this is done they are very uncertain breeders, though they may be able to perform the sexual act.

Suggestions to Committees of Heavy Horse Societies.—We believe that stallions should be hired not later than the October of the year before the season for which they are required; this would enable the stallion owners to adopt a less forcing ration for their animals, and might induce them to winter their charges out at grass even to as late as the February before the season, and we have no doubt that, should the Committee express the wish that the stallion be sent to begin his duties in good hard condition and free from all superfluous fat, it would be agreed to. We strongly advise the Committee to limit the distance that [illegible] stallion has to travel to not more than 10 miles per day, inclusive of off-lying farms.

Further, we strongly recommend that the season should not begin before the 15th April, and should extend a couple of weeks later. This arrangement would be beneficial in many ways, the principal advantage being that it would avoid the most changeable weather of the year, greatly lessening the risks of chills and colds which many stallions contract in the first few weeks of the season. It would enable many mare owners to finish up the hard work on the land, thereby easing the brood mares; if possible such mares would be better out at grass during the day. The extra two weeks would enable many mares to be served which had been difficult to "catch," and the majority of the mares in mid-May and June would be attended to over the critical period of 7 weeks.

We have ascertained from many famous Shire-breeders and owners their opinion as to the time when stallions should begin to travel their rounds. Amongst the replies the following may be quoted :—

Messrs. Forshaw stated that in their opinion the stallion season should begin at least a fortnight later than at present.

Mr. F. W. Griffin, Boro' Fen, writes : "As a stallion owner and large breeder, I certainly think the middle of April soon enough to start travelling. . . . My best foals are those born in April or early in May."

Mr. Thos. Ewart, Dunsmore, writes : "What I do myself you may consider is what I believe in. I travel stallions in six different districts, private rounds apart from horses let. Of course, the latter have to go when the Society wish. I used to start my private horses out as near the 1st April as possible, but the last two or three seasons I have not started any of them until the second week in April, and I think of even going later in some of the districts. Very few mares are served the first or second weeks, and 80 per cent. of the first week or two in April turn again."

Many breeders have also expressed the opinion, and experience has taught them, that the end of April and May is the time for their mares to foal down. One large breeder stated that his orders were that no stallion should call on his farms before May.

Unfortunately the Stud Books do not help us to ascertain the percentage of the early-bred foals in their subsequent careers. The following list of the foalings of well-known Shires are, however, evidence that it is not a necessity to have early foals :—

"*Buscot Harold,*" 21st *April*, 189[illegible].
"*Dunsmore Premier,*" *end of May or June*
"*Mere Duchess,*" *April*, 1890.
'*Dunsmore Combine,*" 1st *July*
"*Dunsmore High Cross,*" *April*
"*Boro' Forest Queen,*" 13th *May*, 1906
'*Dunsmore Chessie,*" *last week in May*
"*Boro' Forest Lady,*" *April*, 1909
"*Duchess 2nd,*" *April*, 1894
"*Southgate Honest Tom,*" *5th August*
'*Dunsmore Gloaming,*" *April*
"*Dunsmore Cui Bono,*" *April or May.*
"*Pendley Duchess,*" *4th May*

Many celebrated animals, however, were foaled earlier :—

'*Grand Duchess,*" *February*, 1897
'*Pendley May Queen,*" *8th February*
'*Champion Challenger,*" *15th March.*
'*Pendley Royal Princess,*" *10th March.*
'*Pendley Princess Mary,*" *18th February.*
'*Pendley Leader,*" *15th February.*

Almost all the above animals were London and Royal Show winners, but, as will be seen, the majority are foals born in April, or even later.

We hope stallion owners will set the fashion, if fashion it is, to send the sires out in good, hard condition. We are of opinion that the change from cooked food, which the majority of the stallions get at home, to dry or damped food on the road is too drastic, and may be one of the many causes of the early mares coming over.

We trust that stallion owners will insist on the necessity of washing the sire after each service (in many studs this is done, but it is by no means general). This is a matter of importance, since we have evidence that contagious sterility affecting the internal generative organs of the mare may be spread by contact with the penis of the stallion. A mare so infected may remain sterile for a prolonged period, or even become permanently barren. This subject, however, is one which urgently requires investigation.

It is hoped that some arrangement can be made for stallions to stand at night at farms or other private stables, and not at the village inns, the usual "gallery" of sightseers not being conducive to successful mating.

Suggestions to Mare Owners.—To mare owners we should like to say that much more careful management is necessary in almost every respect. Taking barren mares first:—To mares which are barren there naturally falls the greater share of hard work during the autumn and winter months. They are usually highly fed, and little or no attention is paid in respect to "cooling them down" before being "stinted." There is evidence that such mares would hold better chances of carrying foals if they were put through a purgative course, not one dose, but several doses at frequent intervals, and if they were given as much grass as possible before going to the sire. They should not be hurried to the sire at the first signs of "season." It is possible that this so-called loss of time would throw them a little late for foaling, but the first object is to get foals.

Moreover, ovulation, or the discharge of the ova from the ovaries (or essential reproductive organs), does not take place until the later stages of "heat," and it is desirable that the mares should not be served until ovulation is imminent.

Another bad practice is to work mares hard all day, and in the evening send them 2 or 3 miles to meet the sire. In this condition of extreme fatigue little hope can be entertained of successful results, especially when no subsequent care is taken of the mares, who on their return to the farm are forthwith turned out among geldings or other mares.

The practice, too, of serving mares before going to work decreases their chance of being in foal. The chafing of the chains and the continual straining are not conducive to a mare "settling."

A further practice, which is more harmful than useful, is the old one of throwing a bucket of water under the tail of the mare (more often on her back) after service, since the mare, especially if she be a filly, may remember this treatment at subsequent services. It is not unlikely that many of the serious accidents to stallions should be attributed to this practice.

During the breeding season, *i.e.*, April to the end of July, as long as generation takes second place to work, a lower percentage of foals must be expected.

Artificial Insemination.—Before concluding this article we desire to draw attention once again to the highly satisfactory results which may often be obtained by resorting to artificial insemination as a means of overcoming certain types of barrenness in mares. There are various published records of the success of this practice, a success which has been further demonstrated to us in our own personal knowledge and experience. It is not a little remarkable that artificial insemination of mares is so infrequently carried out. There is, undoubtedly, a good deal of prejudice against it, and this prejudice shows little sign of decrease. Its existence is probably due mainly to two causes. Firstly, it is asserted that foals obtained in this way are apt to be inferior to those got by the normal method. This view is without any sort of scientific basis, as is obvious to anyone who knows that (biologically speaking) the really essential act in the sexual processes is the union of the ovum or female reproductive cell with the spermatozoon or male reproductive cell. The subsidiary processes which occur in nature are merely devices to bring about this end. Secondly, there is general ignorance as to what cases of sterility are likely to be successfully overcome by artificial insemination, and what cases are in all ordinary probability incurable by this method. Attempts to induce pregnancy artificially in animals belonging to the second category only lead to disappointment, and unsuccessful results tend to discredit the practice.

Mr. Walter Heape, who has done much to emphasise the usefulness of artificial insemination, gives the following list of malformations or abnormal conditions in which fecundity may be induced by this practice :—

Such defects as flexion or constriction of the canal of the cervix; rigidity of the cervix ; hypertrophy of the lips of the external os, and the formation of false membranes which may effectually close the orifice ; inability to retain spermatozoa in the vagina, owing to abnormal shortness of the organ or to violent muscular contraction after coition ; a want of sufficient muscular power ; abnormal structure or size of the cervix or os uteri, which prevents the free action of the functions of the cervix ; occlusion of the os owing to spasmodic contraction of the muscles of the cervix during coition ; abnormal or excessive vaginal secretions, which may kill or deleteriously affect the spermatozoa, etc., may be overcome by artificial insemination.

It may be added that few cases in which the " heat " periods recur regularly (thus showing that the ovaries are continuing to perform their normal functions) should be regarded as hopeless. On the other hand, mares which come " on heat " very irregularly or very seldom, or which are seemingly always " on heat " (that is to say, mares who will receive the stallion at any time) are unlikely to become pregnant as a result of artificial insemination, since in such cases there is presumptive evidence that the ovaries are not undergoing their normal activities. Furthermore, with mares in whom barrenness is associated with an abnormal discharge from the vagina or uterus insemination is not to be recommended.

We have reason for believing that one of the commonest causes of barrenness in mares is inability to retain the semen after service by a stallion, and it is a curious fact that evacuation of the fluid may take place without it being noticed by the horseman, and consequently the mare will remain barren.

A case which observation showed to be of this kind was brought to our notice by Mr. A. J. Edwards, of West Lodge, Sutton, Cambridgeshire, who had a mare aged seven that had been barren since she was a three-year-old, although she had come in use regularly each year, and had repeatedly been served. On the last occasion that this was done, one of us by arrangement was present with a glass beaker and an inseminator. After copulation the mare almost instantaneously evacuated all or nearly all the semen, showing that the latter had not entered the uterus. Thereupon the beaker was used to catch the semen, and a very considerable quantity was collected. This was sucked up by the inseminator, which was then inserted through the vaginal opening and mouth of the uterus, the entrance being sufficiently dilated to make it practicable to inject the semen well forward into the body of the organ. After this had been successfully accomplished the mare was watched for a few minutes to see if there was any further evacuation, but none occurred. Moreover, a sample of the semen was found on examination to contain large numbers of active spermatozoa. The mare, who was inseminated on 17th May, 1917, failed to show signs of heat at any subsequent time, but was duly tested at the usual three-weekly intervals. Since this was done, she has shown herself indubitably to be in foal, and this is her condition at the time of writing, or ten months after the insemination.

Recent researches both in this country and in Japan have demonstrated that in suitable artificial media the spermatozoa of the horse may be got to survive for many hours or even days after ejaculation. *It is evident, therefore, that wide possibilities are here opened up in regard to the adoption of methods for increasing fecundity and overcoming avoidable sterility.*

In conclusion, we should like to express our indebtedness to Messrs. Forshaw, Mr. T Ewart, Mr. F. W. Griffin, Mr. H. W. Bishop, and Mr. W. Chatterton, for valuable information and suggestions, as well as to thank Mr. A. J. Edwards for kindly allowing us facilities for investigating the case of sterility in the Shire mare in his possession.

RATS: HOW TO EXTERMINATE THEM.*

PART I.

R. SHARPE.

Rats an Urgent Problem.—No words which I could use would be capable of exaggerating the seriousness of the present rat situation. We have witnessed during the past year energetic and costly efforts to increase the area of land under cultivation, but no steps whatever have been taken to safeguard the crops from destruction by rats, either during the growing stages or after harvest. Before the War rats existed in numbers which represented a considerable reduction of available food supplies. Latterly they have been allowed to multiply almost unchecked. To-day we are faced by the consequences in fully matured form. The rat problem has never been properly taken in hand. Estates where game preservation was conducted were, for the most part, kept free from rats as from other vermin, but this left unaccounted for huge areas of unpreserved land, which acted as centres for their distribution. The methods of the gamekeeper are held up to reproach, and I fear that this prejudice will never be removed until the processes of game-keeping are extended to the whole countryside, not merely as a means of promoting enjoyment, but with strictly utilitarian purposes in view. As a working keeper, it is not my job to lecture other people. All I can do is to set down in writing my own experiences, and suggest that the same thing ought to be done on a larger scale. There is just time to save the coming year's crops from utter destruction. My methods are crude and simple. Is that an objection? Surely not, if I can show that they are effective.

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* This article has already appeared in a more extended form in *The Field*.

Some Instances.—I have recently paid a short visit to the Wiltshire Downs. Some stacks which I examined were badly infested with rats. On mentioning the matter to my conductor, I was told that it was nothing. for there were other stacks in the country simply alive with rats. With rats it is not so much a case of what they eat as what they destroy. The former is insignificant compared with what they render unfit for human consumption. I doubt if anyone who is not conversant with what is going on about the farmsteads is aware of the amount of potatoes that are being destroyed at the present time, to say nothing of corn threshed and unthreshed. Last March I visited a farm in Hertfordshire for the purpose of ordering some seed potatoes, and happened to hear of a particularly good kind. This led me to visit the place, and in passing through the buildings I saw potatoes lying all over the place. which had been carried there by rats and left. On going to the house where the potatoes were stored, I saw a sickening sight of waste, some potatoes half eaten, others carried out of the straw and frozen. There must have been at least 2 cwt. outside the heap or exposed to the frost. What the state of affairs was under the straw I could only imagine. I drew a friend's attention to the matter, and his remark was: "Oh, that's nothing to what it is sometimes." If this is happening all over the country, many millions of pounds' worth of food is being destroyed by rats, yet nothing is done to prevent it, and we are told that tonnage is scarce.

Two years ago, when looking over a field of wheat which had just burst into ear, I was told by the bailiff, who was proud of this particular kind of wheat, that the rabbits had just started cutting it down, and he pointed out where this had been done. Now I had seen plenty of evidence of rats in the surrounding hedgerows, and there were runs passing out into the standing corn. I accordingly questioned him on the point, and suggested it was rats, well knowing that it could be nothing else.

He pooh-poohed the idea, but it did not take me long to bring him to my way of thinking. On going some distance out into the field we found more damage than he had previously been aware of. In this case the rats had cut the stems off at the first joint for the sake of the small piece of succulent growth there to be found. Hundreds of ears of wheat were so laid on the ground. I advised him to have the rats poisoned at once. This was done, and the damage forthwith ceased.

Attitude of the Farmer.—Things would not be as they are if rats had a market value. In that case the farmer might resent the keeper killing them just as he now objects to him killing rabbits. As the farmer cannot sell the rats, he expects the keeper to kill them off for him, the keeper getting few thanks for his pains. I would not wish it to be understood that all farmers are alike in this respect; far from it, for there are those who understand and appreciate the efforts of the keeper to destroy rats. From personal experience, I fear I must give as my opinion that the majority of farmers are of the other way of thinking. Where there is no keeper to undertake the strictly agricultural duty of rat extermination these rodents usually abound in large numbers, the surplus from time to time passing elsewhere by migration. The rat is so prolific that if anywhere neglected its population very quickly outstrips the feeding powers of the neighbourhood.

The Present Year a Peculiarly Dangerous One.—Last autumn, as all will remember, was remarkable for its large acorn crop. Many keepers and trappers have been withdrawn for military service since the previous good acorn year, 1915. In the present spring there will be hardly anyone left to attend to the rats, the few keepers who remain having in the majority of instances been transferred to other occupations. When acorns are plentiful rats lay up a winter store in the hedgerows, where they remain as long as the supply lasts, moving after that to the wheat stacks. Many of them find no need to return to the farm buildings for the winter, as is their usual custom. When spring comes they live on young birds, rabbits, or anything which comes in their way. This lasts them until the time when the corn crop approaches maturity.

The Diet of Rats is Largely Governed by Scarcity of Food.—I have seen evidence of an old rat having actually collected the big worms that one sees on grass land in the early morning. These were cut into two or three pieces, and had been placed under the ledge of a bank where the sun shone. If a rat will descend as low as this when hunger is upon it, what will it not do?

So long as natural food is plentiful, it will live in peace with rabbits, chickens, pigeons, and fowls. Rats, of course, do an enormous amount of damage to game. They clear off every nest they come across, and I have even known them kill full-grown rabbits. But by nature the rat is a vegetable feeder, and I am quite sure it will never kill bird or animal of any kind so long as it has not been previously driven to it by the exhaustion of its natural food. As a last resort, it turns cannibal, one devouring the other, and the fittest surviving.

Military Camps and Munition Works a Source of Danger.—The War has led to the establishment of a large number of rat-breeding centres in places where before there were no special attractions. Efforts to use garbage by recovering fat and other material going to waste is all to the good, but I fear that there are many places where this wise economy is not being practised. Whatever may have been the rat's original purpose in life, it has developed into a garbage eater, but it does not confine itself to scavenging operations if sweeter and more toothsome diet can be had. The destruction which takes place in all kinds of stores, and the number of sacks, bags, and other containers which are ruined in the process make a huge total.

The Natural Enemies of the Rat.—There are many who maintain that if keepers had not destroyed stoats, weasels, etc., we should not hear so much about the rat. My own conviction is that stoats, for instance, are not so keen on this job as some people would have us believe. From my own experience, I am quite satisfied that stoats and weasels always prefer to prey upon a harmless foe that does not show fight. Never have I seen a big full-grown rat being hunted by a weasel or stoat, though I have occasionally seen both the last-named hunting very young rats. If weasel or stoat—and there are plenty of them about—were in the habit of tackling big rats they would be bound to show the scars where the rats had bitten them. The rat, from the formation of its mouth, is capable of marking a much larger opponent—that is when in a hole. In my opinion, it is impossible for a stoat, weasel, or ferret to kill a rat that is facing it without being first cut about itself. Rat extermination is a task which the human race cannot delegate. Could I honestly give either stoat or weasel credit for being an industrious worker in the cause of the destruction of rats I would do so, but, bluntly, I cannot. I have often been at a loss to understand why rats have been allowed to increase to such an extent on certain farms which I have known. Perhaps the farmer, like certain theorists, is waiting for the stoats and weasels to begin their work. The fact remains that I have known as many as 300 odd rats killed out of one wheat stack which took but a single day to thrash. One hundred to 150 is quite a common total.

Migration of Rats.—When, as a result of neglect, a farm has become over-stocked with rats they migrate to neighbouring land. A farmer who may have been industrious in keeping his land clear of rats, and has spent considerable sums of money in the process, is then suddenly confronted with the same penalties as if he had himself been lax all along. Rat management has two distinct aspects, the one referring to situations where the rats have obtained the upper hand, the other where they are under control, and only odd ones have to be dealt with. Each condition requires its own system of treatment, and the confusion of one with the other leads to a lot of misunderstanding.

Those who object to the use of poison, and quote instances where success is obtained without its aid, would do well to ponder over the following narration of fact. During my tenancy of the Stoughton Manor shooting I had an experience of rat migration which occurred during the course of a few nights. We happened to have just commenced to trap rabbits, otherwise we might not have realised so quickly what had happened. In its normal state the shooting was naturally kept free from rats, but we were suddenly plunged into a condition which years of neglect could hardly have equalled. Without any warning, we suddenly found ourselves catching as many rats as rabbits. Very little could be done, for the coverts were strewn with acorns, that season's crop having been exceptionally prolific By good fortune, there arrived hundreds of thousands of wood pigeons, which soon cleared off the greater part of the acorns. But for this I do not know how I should have dealt with the rats in the following spring. They would have been certain to ruin the shooting, for they were in such numbers that it would have been impossible to trap them all. There was not a single rabbit burrow in the whole of the 600 acres of covert that was not infested with rats. When ferreting I have seen as many as twenty big full-grown rats bustle out of a hole as fast as they could, one after another. Sport was fast and furious at such times, and I must have used quite 2,000 cartridges on rats alone that season. As I have said, thanks to the pigeons the acorns did not last long, and this enabled me to poison the rats.

The Poisoning Campaign.—The actual attack upon the rats in bulk necessitated the purchase of a considerable amount of poison. No less than two dozen 5s. tins of Sanford's rat poison were ordered, and never was £6 better expended. The total acreage of the shoot was 2,000 acres. On the day chosen for the operations my staff of five men were ordered to be ready for an early start. We went two and two, and did the whole of the hedgerows first, dropping the poison well down into every hole we came across. The fences finished, attention was next turned to the coverts, and these we did from end to end. Only partial success attends fragmentary treatment. Just why this should be so I cannot say for certain, but my opinion is that once the rats find out that something is wrong they have a way of communicating the fact to their neighbours. I was well repaid for the trouble, for rats lay dead all over the coverts and the fields. Once the process of laying the poison has begun no obstacle must be allowed to interrupt the completion of the task. Success depends entirely on the whole of the rats in the area to be treated receiving their dose on the same night.

The Pond Farm Attack.—I once removed my pheasantries to Pond Farm, Ash. There were hundreds of rats on the farm and in the hedgerows round about. Their presence was accounted for by the fact that the refuse of a " knackery " was dumped down in a field about three-quarters of a mile away from my house and pens. It so happened that as this foul-smelling stuff had to be brought through the public streets the authorities stepped in and ordered other means of disposal to be found. This happened just before my tenancy began, and the rats were doubtless looking around to discover some fresh source of food supply. They could be seen running about in broad daylight. On the day I decided upon their destruction I proceeded in just the same way as before described. I did all the fences within half-a-mile radius of the field where the offal had been dropped. It so happened that there was near by a wheat rick riddled with holes, as also was an adjoining length of bank. Into each hole in the bank went a piece of " Sanford's." The full results of a rat campaign can never as a rule be known, for many of the victims die in their holes. External evidence undoubtedly exists, but it is in the negative form of a gradual " dulling " of the rat runs, followed in due course by their complete obliteration. This particular case was to prove an exception. I had certainly wondered whether rat poison would be effective when placed in the bank adjoining the unlimited supply of food afforded by the wheat stack. As events transpired, the threshing tackle appeared on the scene two days after I had laid the poison. Passing down the lane about middle day, I was accosted by one of the men, who told me that his master required my immediate presence. His wish was to know whether I had been laying poison, and if so, what kind. For a moment I was taken aback, and replied somewhat evasively, for laying poison on another man's land is rather a serious matter. At last I plucked up courage and inquired why he wanted to know. The reply was, "Come and see." I had evidently got to face the music, so I went along, but my nervousness disappeared when I saw a heap of rats, between 60 and 70 in number, and of all sizes, but chiefly big old rats, most of them as large as a man's boot. Having seen the rats, my spirits rose, and I inquired of the owner of the stack what it was he wanted to know. His curiosity was soon satisfied, for he merely wanted the name of the poison which had produced such results. I forget the exact number of rats finally gathered, but it was somewhere about 100. In one case an old doe was found dead in the nest with a litter of twelve young, all dead, beside her.

When rats abound in large numbers there is no other course to adopt but wholesale poisoning on a properly organised plan. I could give many more instances, but the above must suffice.

Merits of Sanford.—In the course of years I have tried many kinds of poison, including arsenic and strychnine, but Sanford's is the easiest to lay down, and is also harmless to cats and dogs, neither of which will touch it. Should a cat catch a rat which has been poisoned with it, fatal effects will only ensue if the cat eats the "maw," but I do not think this often happens. A rat does not die rapidly after taking this poison. Perhaps that is one of the reasons why it proves so effective. If the first to eat it died immediately the others would have warning. After taking it the rat becomes uneasy, and a cat may catch it whilst moping about. There is something peculiarly attractive to rats about this poison. The poison acts as its own bait. In using it care must be taken to put it where farmyard fowls cannot get at it. Otherwise they will pick it up, and death is certain. The same applies to pheasants, partridges, and blackbirds. Thrushes will also take it if it is not inserted a considerable distance into the rat holes. Being sent out ready for use, the method of applying it is extremely simple. My own plan is to collect beforehand an ample supply of small pebbles. These I take out of my pocket one by one and plaster on each with a broad-pointed knife a little of the poison, a pellet, say, of about the size of a small hazel nut. This I roll well down into the next hole I come to, after which I at once prepare the next dose. There is no need to use bread or any other kind of bait. Some holes allow of the poison being dropped straight down without the use of a stone.

The sole condition of success is to perform the entire laying process in a single day. If I had my way special poisoning days would be publicly notified by the authorities, because, no matter how faithfully the individual carries out the one-day treatment, the area he covers must have its boundaries. To do one fence one day, another the next, and so on, is only to waste poison, and to spoil the effect of proper treatment afterwards. Neither is it any good to lay poison on the same area more than twice in a year, unless by chance it is a place where all the previous occupants have been cleared out and a fresh lot have taken over their quarters. Under the last-named conditions the poison may be used more often, but even so, it must be followed up with the trap, because there is no knowing what experience the rats have acquired in their previous habitation. Should the migrating rats have survived a poison raid they will be forewarned.

Other Poisoning Methods.—The use of arsenic and strychnine for poisoning rats involves the employment of sugar, and hence no purpose can be served by recommending either of the above-named. Moreover, a vast amount of time and labour is involved in applying any material for which rats have no natural liking. Oftentimes they must be steadily fed with meal for a fortnight before they will countenance its admixture with poison. Even when such a programme has been successfully carried through, the results are no better than those obtained with the single dose of Sanford.

No matter what poison is used there will always be a breeding stock left.

The Second Stage of Treatment.—The professional rat poisoner is an excellent person in his way, but in judging his merits we must never overlook the fact that if he does his work too well his occupation disappears. Poisoning is only the first stage of the complete process. Its results are so satisfactory that a testimonial is earned before the evil has been fully dealt with. And here comes the second stage of the treatment. Poison must be followed up with traps, otherwise a breeding stock remains, and the evil repeats itself after a certain interval has elapsed. There is always a proportion of the rat population which survives the poisoning campaign, and these are the animals against which a more patient and gradual process must be applied. The survivors can be cleared off by trapping before they have acquired the cunning which enables them to avoid risks. A large proportion of rats become trap-shy before the process has progressed very far. The same is true of poison if the mistake is made of laying it in sections.

Trapping of Rats in their Runs.—Having fully dealt with the poisoning procedure, I must now consider the after-treatment of the survivors. This is a strictly game-keeping process, but I see no reason why others should not acquire the art. Trapping should be started with full activity within three or four days of the time of laying the poison. Certainly not longer than a week should be allowed to elapse. In setting the traps only the main runs need be considered, for it must be remembered that nine out of ten rats will already have been accounted for. Labour is wasted by setting elsewhere than in the main runs, for the rats which are left will be bound to use them, and an ordinary supply of traps would not suffice for setting the ground more thoroughly. When dealing with a large area the necessity to have all parts of it furnished with traps right away provides another reason for observing moderation. In setting the traps for rats I have often noticed that the novice, and for that matter often the experienced trapper as well, will set a trap square across the run. This is fatal, for it often happens that when a rat treads upon the plate, the jaw, rising square up under its belly, will throw it right out of the way of the closing pincers. This effect is more certain to arise if the rat happens to approach from the direction which will bring him over that jaw which is held down by the catch. The up-jump of the catch is almost certain to throw the rat clear. A few hairs and a wiser rat are the only result for this particular source of failure. Neither must the trap be set truly longitudinally with the run, for it must be remembered that the spring itself also rises with a fairly violent flick. The novice trapper must, in fact, remember that special precautions must be taken in the case of a short-legged animal in the habit of travelling with its somewhat portly corporation near the ground. A trap set for rats should be placed lengthwise with the run, but with about that deviation from the absolutely true lengthwise position which is represented by the angle made between the blades of a partly-opened pair of scissors. A rat run being extremely narrow and very clearly defined, common sense will show exactly how much the spring must be set at an angle to clear the centre of the run, whilst leaving the jaws on either side of the centre. When trapping rat runs in a country where game or poultry abounds, great care should be taken to choose places where these birds are unlikely to wander. Many such places are available, as neither pheasant nor partridge will run into small openings unless pursued or frightened. When such places cannot be found, the only course is to cover the trap with a piece of board during the day. This precaution is essential when trapping in runs near the homestead where poultry are running free.

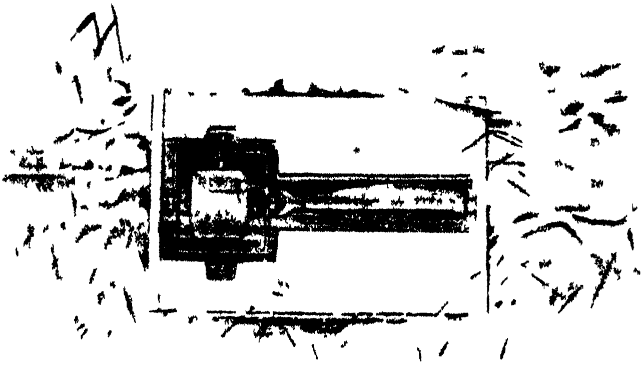
Trapping Rats in the Mouth of their Holes.—Traps are set in rat runs when their holes are not accessible. When there are rat holes large enough for the insertion of a trap, the trap should be placed inside the hole so that it is harmless to poultry, game, etc. Cut out a V-shaped place for the trap, removing the soil to a depth of 1½ in. After putting in the peg to secure the trap firmly press the trap into position, taking care to set it as "light" as possible. Next cover up the spring, making the ground quite firm. Now cover the pan with fine soil. When completed the hole should look as nearly natural as possible. The same kind of trap should be used for rats as for rabbits. Smaller traps, as so commonly employed for rats, need very accurate setting, otherwise the rat may easily miss them. The larger trap has the advantage that it holds its victim higher up the leg, the result being that fewer are able to escape by twisting off the foot. A large trap will frequently seize the rat by the body, this grip and the sudden death it implies being from every point of view the most desirable. Great care must be taken only to use traps in perfect condition. Those with weak springs or loose in the jaws may allow a rat to escape, even though they might still be serviceable for rabbits. Every rat which escapes has learnt a lesson, which not only makes it wary ever after, but the knowledge gained may be communicated to others. Rat traps should be visited early in the evening, not because there is any fear of anyone removing their contents, but because every hour lost gives the captive additional opportunity to escape. For the same reason a second visit should be made before bedtime.

Trapping in Wet Ditches.—One of the most deadly places of all for catching rats is along the wet ditches where runs are always to be found if any are about. When the amount of water passing is only slight, the run is generally up the middle of the ditch, but if the water is too deep, they are driven to use the sides. In either case the cavity for the trap should be so placed and just deep enough to permit the water to cover the trap. No other concealment is necessary. If the runs are on the side of the ditch, a place should be selected where a suitable one just touches the water. There the cavity should be made, so as just to permit the water to flow into the same. So long as the trap and spring are covered with water to the depth, say, of a sixteenth of an inch, the concealment is quite sufficient; in fact, any greater depth of water is to be avoided. If the water in the adjoining bed of the ditch is deep enough to cover rat and trap very favourable conditions exist, because the moment a rat is caught it commences to struggle, and is bound to pull the trap into deep water. It is then quickly drowned, and no trace remains of the tragedy which has been enacted. There is no need to emphasise the importance of sinking without trace. The trap can be re-set for the following night in the same position.

General Hints on Laying Rat Traps.—In selecting a place to set the trap in a rat run, there is not the same difficulty as occurs in the setting of a snare or trap for a rabbit. A rabbit hops, and can, therefore, only be caught in one of the beats, but a rat runs so evenly that any well used part of the run suffices. Success in the case of rats mainly turns on choosing a portion of the run where the cutting of the hole for the trap will cause a minimum of disturbance to the general features of the ground. Care should also be taken to choose a place which promises a supply of suitable covering earth for the making-good process afterwards. The hole must always be made amply deep, so that in filling up afterwards no mound is left to mark the situation of the trap. As in the case of rabbits, the earth must be firmly compacted around the trap and over the spring, this because nothing breeds suspicion quicker than loose earth.

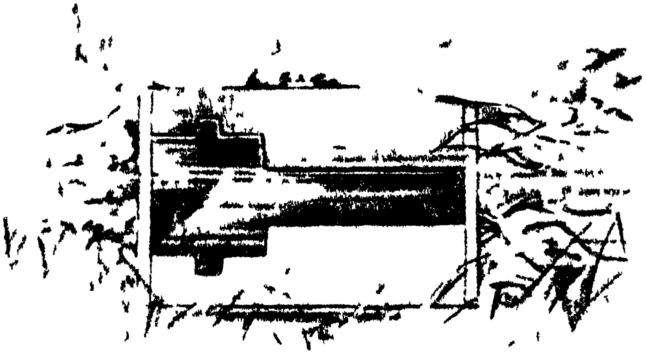
The Bath Trap.—The accompanying sketches were prepared from real life and represent an actual result.

Nature of the Trap.—The device consists of a wooden platform with a cavity in the middle which just receives the trap. The trap is supported in its proper position by means of nails, so placed that two of them lie just underneath the extended jaws. When the trap is sprung the jaws strike up, so leaving their support and allowing the trap to sink in the water, dragging the caught rat along with it. The hole in the ground beneath the platform must be cut of sufficient dimensions to allow the trap to drop freely into the water. If a tank is used the same ample accommodation must be provided. The holes formed in the wood platform should be nicely shaped to fit the trap when in the set position, a square to receive the jaws and a slit for the spring. This last is important, because if the hole in the platform only took the jaws the spring, in striking upwards, would hit the bottom of the platform, the closing of the jaws being so retarded.



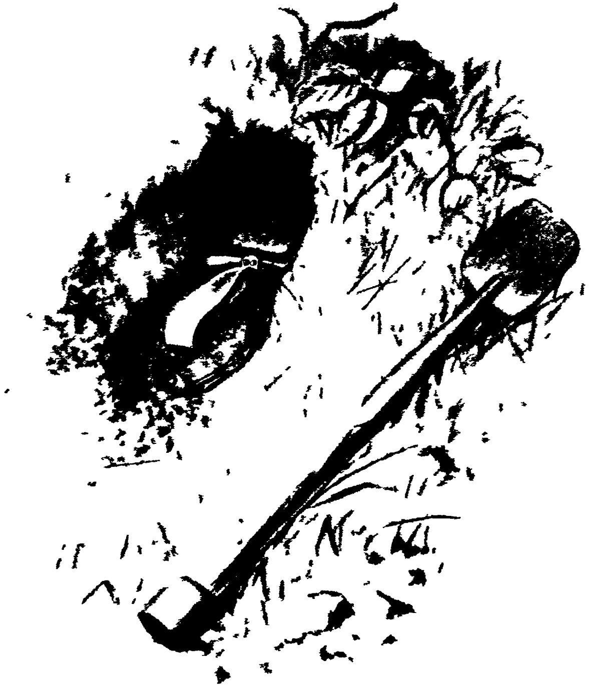
RAT WATER TRAP (FROM ABOVE)

Water just covering surface of trap Raft and trap should be hidden by scattered grass (grass omitted in drawing to show trap)

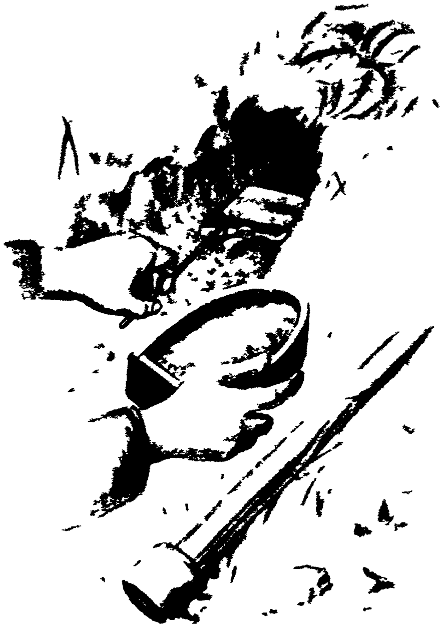


RAT-WATER TRAP (FROM ABOVE)

Rat caught and sunk (grass covering for raft omitted in order to show raft and drowned rat)



Trap in correct position lying on levelled surface of entrance ready to be covered with earth



Sifting earth over trap Showing safety stick

HOW TO SET A RAT TRAP

When setting the trap on this system in a hole cut in a ditch, pegs may be driven into the bottom of the ditch, the tops being arranged at such a height that they support the trap the right distance under water. Three pegs or nails, as the case may be, are required, one for each jaw and the third for the tail end of the trap. When a rat is caught, the closing of the jaws causes them to lift clear of the front pegs, the trap tumbling away from the one remaining at the back. Of course, the whole outfit of platform and trap supports could be made in a self-contained form, with tank attached if need be. Any carpenter could make them, and the rougher and more natural-looking the wood the better. They could readily be turned out on a large scale.

Baiting the Bath Trap.—Bait should be provided in all those cases where the trap, through not being set in the run, must draw the rats before it can catch them. A very large number of systems of trapping are only effective when the process I have described as "breeding familiarity" has been patiently gone through. If every rat which endeavours to take the bait is promptly accounted for there can be no general knowledge amongst the rat population that a generous store-house of food at all times awaits their attention. When a trap of this nature has been put in place greatly increased results will follow if a little patience is exercised at the start. The traps should be set in the ordinary manner, but they should be prevented from working by means of a wooden wedge inserted under each pan. Liberal baiting should then be done, and be continued until there is clear evidence that it is being freely taken. Once the rats have got used to the trap it can be set and remain set thereafter. When rats are so numerous as to require the use of poison the bath trap should, for preference, be held in reserve until after that treatment has been given. All the better if it is put down before the poison campaign starts, for it is then instantly available for the clearing-up process, with all "foil" gone. The interval so allowed may be utilised for baiting purposes, the traps being set at "safe."

The Royal Humane Society would probably be interested in this means of taking rats. It is at once the simplest, the most efficacious, and certainly the most humane of any system I know. No method requires less labour when once the framework has been made. Unlike setting traps in the runs, etc., there is no danger to bird life, and no need for it to be attended to early and late, the rat being dead in a very short time. Being drowned and drawn under water in the process the other rats know nothing of what has happened. The trap also disappears, therefore any rats which may wish to use the run are at liberty to do so. It may remain ready set for weeks, waiting for the chance wanderer, and more especially for the incoming visitor in search of a new habitation and more ample plunder than in its previous quarters. It can be used in any building, because the water-pit may be improvised with a bucket or any similar receptacle.

The Water-pit Trap for Poultry Yards.—On a certain occasion, when I applied the water-pit trap to the clearing of a poultry yard of rats, it was a great success. Poison was absolutely barred, as also was the ordinary sort of trap when set in the ordinary manner, the reason being that the birds were a valuable prize strain. I procured a tub, which was really the half of a paraffin barrel, and, having made a framework to fit the top so that it would take six traps, I set it according to the usual plan. An island was formed in the middle of the tub to take the bait, and to prevent its removal a fine wire-mesh netting was placed on top. The tub was then sunk level with the ground, the water being filled in so as just to cover the traps the before-mentioned sixteenth of an inch. The results were marvellous, the whole of the rats being cleared off in a very short time. The traps remained set afterwards, with the result that any stranger coming along promptly fell a victim. I used any kind of bait—one time a rabbit paunch, another a fish head, then bacon rind, and so on. To prevent the poultry, cats or other legitimate farmyard inhabitants sharing the fate of the rats the whole outfit was surrounded and covered with framework carrying 2½-in. wire netting. It thus lay in full view, but inaccessible to everything but rats.

The Bath Trap for Indoors Use.—I tumbled across this idea when living in a house infested with rats. I did not want to use poison because of the stench which arises when rats die in the walls and under the floors of houses. What I did was to make a framework of wood to fit round a big bath, and I so arranged it that it took six traps in a circle, springs towards the centre. The ends of the springs rested on some bricks built up in the centre, the jaws of each trap resting on a pair of nails driven into the framework. The nails were so placed that the trap lay just under water, the closing of the trap depriving it of their support. Bait of the miscellaneous kinds already mentioned was arranged in the centre. I had great hopes of my scheme from the start, but did not expect immediate results. A pleasant surprise greeted me on the first morning, for three of the traps were submerged, each trap containing a rat about half-grown. In a very short time the house was clear.

Tub Trapping in Dry Country.—I have often thought that my trap would work wonders in the corn districts of such a county as Hampshire, where the harvest is often stacked in the fields. As is well known to those who have given thought to the subject, rats must have water, and will travel long distances to get it. I have often seen them licking the rain-drops off the ends of the thatch of a corn stack in a dry time. Now, with a tub let into the ground in the vicinity of each stack there would be no need for bait, as the rats would be sufficiently attracted by the water. The covering recommended for the traps when placed in poultry yards would be necessary to prevent game and other birds having access to the tub. Such a system would work especially well on chalk lands where water is usually very scarce. In wet or clay countries bait would, of course, have to be used.

Trapping at the Mouth of Drain Pipes.—There is no deadlier place for the setting of rat traps than at the point of emergence of a drain. All that is needed is to dig the pit, place the wooden frame over it, and then fill the pit with water. Very often it happens that the drip from the pipe is sufficient to keep the hole full. In fact, if a standard level of water is available or can be arranged the very best conditions are present. Should the soil be too porous to allow the water to remain, an old bucket or anything of a similar nature can be let into the ground and filled with water. It only then remains to place the trap in position. The whole process is very simple, and if the framework needs making to fit the particular situation the necessary boards can be knocked up in a very few minutes.

Wire Cage Traps.—Traps or cages there are which permit the free entry of rats whilst preventing their departure. Such traps are good if intelligently used, but what generally happens is that a trap-cage is obtained and is straightway baited and set. Hopes run high that the trap will be full up on the morrow; but no, hopes are dashed, for the trap is found empty and the bait not touched. What really ought to be done, and must be done if success is to be obtained by the use of the wire cage, is first of all to breed familiarity. This may be done by fastening the drop-door in such a way that it stands open, and the same should be done with the further door which is provided for dropping the rats into the drowning-tub. A liberal supply of bait should be placed in the trap, the trap itself being located by the side of a wall in an out-house or any other place frequented by the vermin. The direction of the trap should be such that there is a straight run through. Bundles of straw, old sacks, and similar material should then be used to cover the trap. No matter if the entrances are closed, for once the rats learn of the bait and begin to take it they will soon find a way through. The great thing is to make the whole outfit look as if your only wish was to keep the rats out. In a few nights they will have cleared up the bait. Bait and bait again for at least ten days, at the end of which time the inner trapdoor may be let down and the further end closed up. Bait the trap as before and cover up with straw, always handling the trap as little as possible so as not to leave too much "foil" about. Those who have had the patience to follow out the whole of the above procedure will be rewarded with a good haul the first night the cage is set for catching. After the haul, repeat the dummy treatment until evidence is once more available that the rats are again feeding with impunity. This usually happens after three or four nights of philanthropy. Plans may then be laid for a good second haul. The best way to kill the rats once they are caught is to immerse the whole cage in a tub of water. Some people kill them in the cage by various methods, and that means leaving blood about. Such a course is fatal to further success. By drowning the rats the danger of spoiling the trap for further immediate use is avoided.

(*To be concluded next month.*)

IS ONION GROWING WORTH WHILE?

DOUGLAS NEWTON.

ONION growing is, and always has been, somewhat of a gamble.

It was emphatically a gamble under pre-war conditions, when the home cultivator had Spanish, Dutch, Egyptian and other competition to face; it is still a gamble in these years of war, although foreign rivalry is virtually eliminated. The outstanding fact of the situation for the onion-grower is a fixed selling-price of £15 per ton for his produce*. On the other side of his account he has to face prices for labour, seed and fertilisers, which are by no means fixed, but are constantly and inexorably rising against him.

Labour and manuring, of course, are items that vary greatly according to locality, but the increase in the price of seed is common to the whole country. In 1915 good onion seed could be obtained for 5*s.* 6*d.* per lb.; in 1916 the price rose to

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* Latest prices fixed are given at p. 1466 of this *Journal.—Ed.*

10*s.*; in 1917 to 15*s.*; and in the present year there has been a further formidable jump to the neighbourhood of £2.

In circumstances such as these it is no matter for surprise that agriculturists in all parts of the country are asking themselves the question: "Is onion growing worth while?"

That it ought to be made worth while, it seems, goes without saying. The onion is an absolutely indispensable vegetable. For culinary purposes it is in daily, almost hourly demand. Its medicinal properties are known the wide world over. The ancients Egyptians worshipped it as a god-given bulb. We moderns in our more prosaic way are quite as keenly alive to its manifold virtues, not as a vegetable alone, but also as an invaluable seasoning, and an article of medicinal merit.

The country, then, must have onions, if it is permissible in these days of shortage to speak thus positively of any particular public need. The demand being so insistent, and foreign competition being, as already stated, practically eliminated, what hinders the raising of abundant onion crops by British growers? The answer is to be found in that element of uncertainty which has invariably characterised British onion-production.

In 1914, the latest year for which statistics are available, no less than 7,499,313 bush. of foreign-grown onions were imported into this country.

Ample acreage would be available in our own country for the production of all the onions we need were it possible to make the proposition a reasonably "safe" one from the cultivator's standpoint. The land in England and Wales under arable cultivation, as shown in the preliminary statement of Agricultural Returns for the year 1917, was returned as 11,246,040 acres. Of this total the area devoted to onions was 6,470 acres—which, even if it produced 60,000 tons of onions, was approximately a matter of only *3½ lb. of onions per annum per head of the population.* Such an output is, of course, absurdly inadequate for the national needs. An enormously increased production is called for if the country is to be rendered self-supporting, or to be placed in a position somewhere approaching the self-supporting stage, in relation to its harvest of onions. What are the prospects for such extensions, and in what parts of the country are successful results likely to be brought about?

Onion-Growing Districts.—The most cursory glance at the returns for individual counties reveals at once the extraordinary prominence of Bedfordshire in the British onion-growing business. Of the total area under onions in England in 1916, the most recent year for which complete returns are available, of a total acreage of 4,685 acres, Bedfordshire could claim no less than 1,137 acres, or not far short of 25 per cent. of the whole. It is a fair assumption that what is good for Bedfordshire must in some degree be good for its immediate neighbours : but a further reference to the official returns shows the whole of Cambridgeshire including the Isle of Ely with only 98 acres under onions, Huntingdonshire also with 119 acres, and Northamptonshire with an even worse figure of only 37 acres. In these counties, bordering upon the home of the redoubtable "Bedfordshire Champion," there is surely ample room for a large extension of onion cultivation, coupled as it probably would be with an almost certain prospect of success under prudent and capable management. In the fertile Cambridgeshire country, in particular, the onion should thrive apace. Of this, indeed, I am able to offer tangible evidence in a balance-sheet showing the actual returns from a Cambridgeshire onion plot in 1917.

Yield and Returns.—On an area of 2½ acres in Cambridgeshire, carefully measured, situated, be it noted, in a district of Cambridgeshire where onions are not usually grown, a yield of close on 30 tons of first-class onions has been obtained.

It will be interesting to go back a little farther and contrast these figures with the results of somewhat similar plots for the years 1915 and 1916 :—

(I.) ONIONS GROWN IN 1915.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
Rent—				Sale of onions ..	50	0	0
Five acres at £2 ..	10	0	0	Unexhausted value of manures ..	8	19	0
Cultivation—				Balance, being loss	41	14	9
Ploughing, hoeing and harrowing	5	5	0				
Manures	17	18	0				
Seed—							
55 lb. "Beds Champion"	15	2	6				
Labour—							
Weeding, pulling, etc.	44	8	3				
Overhead and other charges	8	0	0				
	£100	13	9		£100	13	9

Here the gross loss was £50 13*s*. 9*d*., but an allowance of 50 per cent. of the cost of manure as representing unexhausted value, brings the deficit down to £41 14*s*. 9*d*., or over £8 per acre. So much for 1915.

(II.) ONIONS GROWN IN 1916.

Dr.	£	*s.*	*d.*	*Cr.*	£	*s.*	*d.*
Rent—				Sale of onions in the ground	120	0	0
2 acres at £2	4	0	0				
Cultivation	3	10	0				
Manures	18	10	11				
Seed—							
11 lb. "Beds Champion," and 16 lb. White Spanish	11	16	0				
Weeding	14	15	0				
Overhead and other charges	10	0	0				
Balance, being profit ..	57	8	1				
	£120	0	0		£120	0	0

Here the balance is profit instead of loss, and this in spite of relatively higher expenses.

For example, cultivating charges (ploughing, harrowing, drilling) account for £3 10*s.* for a 2-acre plot as against £5 5*s.* in the previous account for a field of 5 acres. In "seed" a similar discrepancy occurs, 27 lb. being used to sow 2 acres as against 55 lb. for 5 acres; this is accounted for by the fact that the White Spanish for the 1916 sowing germinated disappointingly on test—only 45 per cent. in soil and 66 per cent. in incubator, as against 82 per cent. pure, good seeds in the case of Bedfordshire Champion. Manuring, again, was proportionately a much heavier item than in the previous example, and this may partially explain the more fortunate result in the latter year. Principally, however, the profit earned was due to the enhanced price received for the produce. Onion crops realised very high prices in 1916, in some cases over a hundred guineas being paid for a single acre of onions in the ground.

A third and final example (1917) relates to the Cambridgeshire plot, of which the bare yield has already been given:—

(III.) ONIONS GROWN IN 1917.

Dr	£	*s.*	*d.*	*Cr.*	£	*s.*	*d.*
Rent—				Sales—			
2½ acres at £2 ..	5	0	0	10 tons at £30 ..	300	0	0
Cultivation	5	12	0	3 cwt. at 20s. ..	3	0	0
Cleaning (hand hoeing) ..	20	1	0	1 ton, 15 cwt. on commission ..	23	4	9
Harvesting	28	0	6	5 tons at £15 ..	75	0	0
Seed—				Estimated store in loft	75	0	0
13 lb. Up-to-Date, 12 lb. White Spanish ..	18	15	0				
Manuring	23	5	6				
Rent of onion loft ..	5	0	0				
Wear and tear of carts and machinery ..	6	0	0				
Office and overhead charges	5	0	0				
Balance, being profit ..	359	10	9				
	£476	4	9		£476	4	9

Here a good crop, showing nearly 9 tons of saleable onions per acre, combined with an immediate sale of nearly half the crop at the price of £30 a ton, produced a profit calculated to make even the most confirmed agricultural "pessimist" rejoice. But 1917 was a year of big prices; so also, in a lesser degree, was 1916. In these two years the onion-grower who failed to come out with a profit would have had to be singularly inexpert at his business or most deplorably unlucky.

Enough of the past. What of the future? How will 1918 and 1919 serve the onion grower? With fixed selling prices of £15 to £18 per ton will he be able to "make good" in the face of increased expenses all round?

In considering these questions it may be as well to inquire whether, in the past, bad crops of onions have not been in some measure due to errors of cultivation, and whether in the future we may not hope by improved methods and organisation to achieve results that will improve the prospects of onion-growers.

Soil.—It is too sweepingly asserted that onions can only be successfully grown on specially selected land. The plain fact is that a small plot of suitable ground, rich and loamy, for onion cultivation may be found on almost any strong-land farm or small holding, the most suitable being a piece of alluvial, loamy soil, which will often be found near the bottom of a heavy clay field. The land must, of course, be well drained and in good heart.

Previous Crop.—A strong point in the onion's favour is that, provided it is well and suitably manured it will not rob the next crop. As regards the "preceding crop," there is nothing better than fallow, as this saves much labour in weeding, which is one of the expensive items in the cost of production. Moreover, weed seeds frequently germinate before the onion plant and are apt to get ahead of it and to choke it. The cost of the fallow must in this case, of course, be charged against the onion crop.

Seed.—Good "keeping" sorts should be grown. "Bedfordshire Champion" and "Up-to-Date" are excellent in this respect. Seed testing is essential, for it is by no means uncommon to find that old seeds have been blended with the new, which, now that the seed alone costs nearly £20 per acre, is a serious matter, and sometimes results in unhappy consequences for the unwary grower.

Labour.—Women workers may be employed, and now that women wear land clothes there is not the same danger of damage to the young onion plants during the hand-weeding period as there was in pre-war times.

Manuring.—Artificial manures should be used to supplement the ordinary farmyard dressing, which should not be less than 20 loads per acre of short, well-made manure. There is a common belief that large quantities of artificially-supplied potash are required; in strong land, however, this is not essential when farmyard manure is used, as a sufficiency of potash is forthcoming from that source.

A suitable dressing of chemical fertiliser to supplement the farmyard manure is 10 cwt. of 26 per cent. superphosphate applied in the spring, or 15 cwt. of high-grade citric-soluble basic slag worked into the soil in the autumn. A dressing of soot at the rate of 100 bush. to the acre is also helpful.

Storage.—A special onion-loft is essential as it is often difficult to sell the onions at harvest time. It should stand 4 ft. off the ground and have slatted sides, as a through draught of air is necessary to keep the onions dry, while any approach to dampness causes the stored onions to go rotten or shoot into a new growth.

Onions on Small Holdings.—For small holdings the onion is a most valuable crop, for there is no vegetable that better repays assiduous care in cultivation. And in this direction there is much scope for increased onion-growing. According to the figures for 1916—the latest available—27·56 per cent. (*i.e.*, 118,064) of the holdings in that year were above 5 and not exceeding 20 acres, and 18·34 per cent. (viz. 78,587) were between 20 and 50 acres. If we add to these the holdings of 1 to 5 acres we find that 66·33 per cent. of the total holdings in England and Wales are small holdings, many of them probably well suited to grow their quota of onions.

That there is urgent need of increased attention to the subject is apparent from the figures given in the latest return of the Board of Agriculture (1914) relating to the imports and exports of agricultural produce. There was in that year no export of onions whatever, but imports, as already mentioned, amounted to 7,499,313 bush., of which 690,544 bush. hailed from Egypt, 4,712,525 from Spain, and 1,339,215 from the Netherlands. The Egyptian supply is probably cut off for some years to come, and the Dutch and Spanish shipments must necessarily take their chance with other merchandise according to the exigencies of the shipping situation, which, at the present time, means that Dutch and Spanish onions are far more likely to remain in Holland and Spain than to reach our ports.

Thus we are faced with a shortage of some millions of bushels of onions. That shortage can only be made good by a determined effort on the part of growers, large and small, throughout the country to increase the home output, and gradually to place us on a self-supporting basis in regard to this valuable and most necessary crop.

THE ENCOURAGEMENT AND IMPROVEMENT OF LIGHT HORSE-BREEDING, 1916–17.*

LIGHT horse-breeding even in normal times is a somewhat speculative business, and it is not a branch of farming that can be regarded as a remunerative one as a general rule or as one that appeals to the majority of farmers. But it is absolutely essential to hunting and to the provision of cavalry and other riding horses for the Army, and on this account it is hoped that farmers and other breeders of light horses will continue to "carry on." The year under review (1st November, 1916 to 31st October, 1917) has been one of difficulty to breeders owing to war conditions. The reduction in hunting, absence of a remunerative market, shortage of labour and increased cost of feeding stuffs have had a depressing effect on the light horse-breeding industry, but the breeder will be well advised to look to the future, to the revival of hunting, polo and the foreign demand after the War. In this connection breeders will recognise the imperative necessity of breeding only from the best possible mares and stallions, for there is no good reason to suppose that there will not be a remunerative market in the future for well-bred high-class horses, whereas there is no prospect of any demand for the misfit.

As was to be expected there was a decrease in the number of mares served by the Premium Stallions, but as the 100 stallions averaged 62 mares each as compared with 69 in the previous year the drop is not excessive considering the abnormal times.

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* This article replaces the Annual Report on the Administration of the Funds provided for the Encouragement and Improvement of the Light Horse-Breeding Industry for 1916–17, which will not be issued separately.

In one respect the horse-breeding operations of the Board in 1917 proved more satisfactory than in 1916 and this was in connection with the National Stud. The hope expressed in last year's report that the National Stud would not prove a serious charge on the Public Exchequer during its first year of existence (1916) was fully justified, the receipts being £2,000 in excess of the expenditure, and the balance-sheet for 1917 showed a surplus of more than double that amount. In view of the difficulties under which blood-stock breeding has been carried on during the last two years these results are by no means unsatisfactory, and are a tribute to the good management of the Stud by the Honorary Director, Captain Greer.

It may be of interest to record that eleven yearlings from the National Stud were disposed of at the Newmarket Sales during the year under review at an average price of £666, and that one of them made the highest price (3,600 guineas) realised for any yearling sold in 1917.

As in previous reports particulars are given of the foaling results of the 1916 Service Season of the Premium Stallions, together with information of the Premium Awards and Service Season in 1917.

Foaling Results of Service Season, 1916.—The foaling results to the services in 1916 show a slight improvement. On the returns received 56 per cent. of the mares served by the King's Premium Stallions proved in foal as compared with 54 per cent. in the previous year. Captain Wickham Boynton's stallion "Birk Gill" served 90 mares and had a foal-getting percentage of 72. On the other hand one of the stallions got in foal only 15 per cent. of the mares served.

The foal-getting records of the Board's Premium stallions were the same as those of the King's Premium stallions, their average foal-getting percentage being 56, which is a slight improvement on the percentage of 55 of the previous year. The best getter proved to be Mr. C. W. Dixon Johnston's stallion "Bellagio," which served 90 mares and got 71 per cent. of them in foal. The least satisfactory sire was one that served 63 mares and had a foal-getting percentage of only 34.

With the completion of the foal returns it is possible to give the average payments made by the Board and the estimated average earnings of the stallions to which Premiums were awarded in 1916.

The average amount paid by the Board in respect of the 48 King's Premium horses was £297, and the maximum £360, which, with the service fee of £1 payable by the mare owners, makes the average earnings £368, and the maximum £450. The average payment for the 12 Super Premium Stallions was £416, and the maximum £470, the average earnings being £495, and the maximum £560.

The comparative figures for the Board's Premium stallions are—average payment by the Board £146, maximum £201, average earnings £210, with a maximum of £291.

Service Season, 1917.—The annual show of Thoroughbred Stallions was held on 27th and 28th February and 1st March at the Agricultural Hall, Islington. There were 175 entries, a record number, and of these 60 were horses that had not been previously shown.

The judges were Sir Gilbert Greenall, Bart., C.V.O., the Hon. Alexander Parker and Mr. I. W. A. Harris. They reported that the quality of the exhibits was excellent, and an improvement on that of former years, and they drew attention to the fact that amongst the new-comers, no less than five gained Super Premiums, including " Rothendo," the winner of the King's Cup.

Sixty King's Premiums (including twelve Super Premiums) were awarded. The King's Cup was again won by a stallion shown by Captain T. L. Wickham Boynton, and the reserve horse was owned, as was the case in the three previous years, by the Compton Stud.

The number of mares served by the 60 stallions, to which Super and King's Premiums were awarded, was 3,888, being an average of 65 mares a stallion.

In addition to the 60 stallions to which King's Premiums were awarded 40 other stallions travelled, to which Board's Premiums had been awarded. The mares served by the latter stallions numbered 2,333, an average of 58 mares a stallion.

Of the horses to which Board's Premiums were awarded 34 were thoroughbreds and Percheron, and 27 of them had been exhibited at the London Show, 11 obtaining the Reserve Cards, which are only awarded to stallions up to King's Premium merit.

As in previous years the service arrangements were supervised by voluntary local committees, to the members of which the Board are much indebted for their assistance.

Riding Pony Premiums.—The award of these Premiums, which are of the approximate value of £80, was first made in 1914 on the recommendation of the National Pony Society, with the object of encouraging the use of high-class pony sires for the service of pony mares not exceeding 14·2 hands. Six

Premiums are offered annually, but apparently they are not sufficiently attractive in value to secure a large entry of pony stallions to compete for them.

The average number of mares served in 1915 and 1916 was 53, and 45 in 1917, and the foaling percentage to the 1915 service averaged 55 and 58 to the 1916 service.

A revision of the regulations governing the award of these Premiums is under consideration.

Premiums to Welsh Cob, Fell, Mountain and Moorland Ponies.—Premiums for Welsh Cob Stallions are approximately £50 in value. They are awarded on the recommendation of county committees, but only in respect of stallions which are certified by the Welsh Pony and Cob Society to be of the Old Welsh type. Free nominations are authorised for issue to 25 mares for service by each stallion on condition that the mares are entered or accepted for entry in the Welsh Stud Book, and have been passed sound for breeding purposes. Premiums were awarded to 15 cob stallions in 1917, and they were located as follows :—3 each in Cardigan, Carmarthen and Montgomery, and 2 each in Brecon, Merioneth and Radnor.

Premiums for Fell Pony Stallions average £45 in value, and are awared by judges selected by the Fell Pony Committee. Five such Premiums were allotted in 1917.

The efforts that are being made by the Board to improve the breeds of mountain and moorland ponies are being well supported by the various local pony association. Premiums of £5 are awarded to stallions which have been registered by the Board and selected as of sufficient merit by a judge, Mr. Coltman Rogers, in Wales, and Mr. T. F. Dale, in the New Forest. Assistance is only given in districts in which regulations under the Commons Act, 1908, have been put into operation, or where arrangements are made to secure observance of similar regulations, as in the New Forest, which prohibit the turning out on commons, etc., of any immature or unsuitable pony stallion. Thirty-one Premiums were awarded to ponies and 10 to those in the New Forest.

Brood Mare Scheme.—No funds were available during 1917 for the award of grants to county committees for the purchase of brood mares, and difficulty is experienced in finding custodians for mares returned to the committees that are not suitable for doing work of some kind.

Registration of Stallions.—The number of stallions registered for the year under review was 1,829. Of these 1,034 were

Shires, 262 Thoroughbreds, 146 Hackneys, 143 ponies, 131 Clydesdales, 87 Suffolk Punches, 12 Hunters, 8 Yorkshire Coach Horses, 3 Cleveland Bays, 2 Percherons and 1 American Trotter.

The number of stallions rejected was 124, of which 84 were Shires, 13 Clydesdales, 12 Thoroughbreds, 6 Suffolk Punches, 5 Hackneys, 2 ponies and 2 Hunters. Fifty-six of the rejections were in respect of stallions which had not been previously examined for registration, and the other 68 were stallions which had been registered in the previous year.

The ages of the stallions rejected for registration included all ages from 3 to 16, excluding 11 and 14, but even those two years were included in the ages of the stallions rejected on examination for re-registration. These returns afford evidence of the difficulty of fixing an age limit after which a sound stallion should be given a life certificate—a suggestion which has been frequently made to the Board.

The diseases, on account of which the above-mentioned 124 stallions were rejected, were: whistling (26), roaring (2), sidebone (33), cataract (13), ringbone (6), defective genital organs (4), stringhalt (8), bone spavin (3), shivering (5), and 4 stallions were rejected on account of bad conformation. There were only 16 appeals against the verdict of the examining veterinary surgeons, and of this small number only 7 were successful.

AN EXPERIMENT IN THE TREATMENT OF "COVERED SMUT" OF BARLEY.

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Introductory.—A field of barley is sometimes seen, some little time before harvest, to be affected with a disease which affects the ears. The diseased ears are conspicuous from the first by their blackened appearance; later they become dusty with a soot-like substance, hence the popular name of "Smut" given to this disease by farmers. A closer examination frequently reveals the fact that two types of disease are present; in one, called "Covered Smut" (Fig. 1) the blackened ears remain covered over with the remains of the husk until nearly harvest-time, when they become "sooty" or "smutted"; in the other type, "Loose Smut" (Fig. 2), the diseased ears, which appear earlier than the healthy ones, become "sooty" almost at once, and the "sooty" mass disappears long before harvest time, when only the bare stalk of the ear is seen.

Each disease is caused by a distinct fungus, and each has a different life-history. The remedy which the farmer can use is based on the peculiarities of the life-history of the fungus. It is essential, therefore, that the farmer should distinguish which type of "Smut" is doing the damage. The photographs (Figs. 1 and 2) will enable this identification to be made; and the life-history of each fungus is described briefly below.

LIFE-HISTORIES OF THE BARLEY "SMUTS."

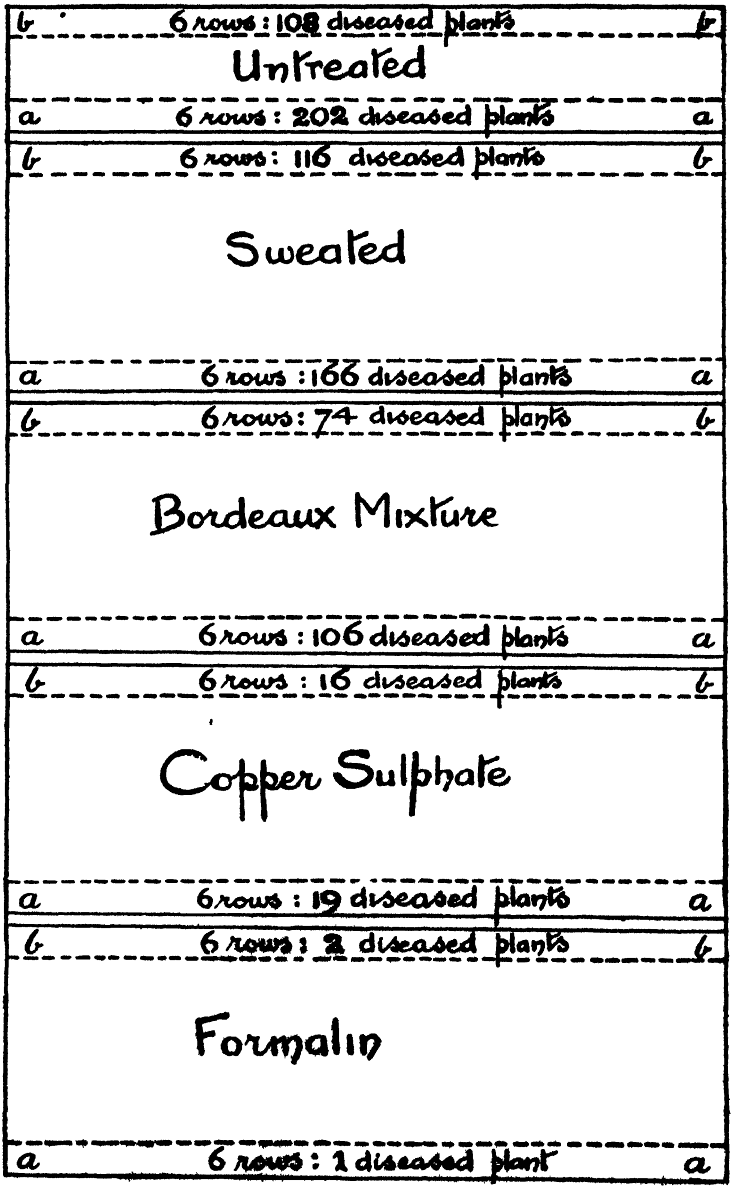
1. "COVERED SMUT."—The fungus which causes this disease is known as *Ustilago Hordei* (Pers.) Kellerm et Sw. The black, "sooty" powder which is found in the diseased ears consists of myriads of minute, seed-like bodies, called *spores*. Each *spore* is exceedingly minute, averaging about $\frac{1}{5000}$in. in diameter. When the barley seedling is a few weeks old, any single *spore* (which may be adhering to the outside of the barley-seed when planted) is able to attack its delicate, young stem and penetrate it. Inside the stem the fungus forms a "spawn" (*mycelium*) of fine threads, which grows up inside the young stem (keeping just behind its growing-point) without causing any noticeable injury until the barley begins to come into ear. The "spawn" of the fungus then grows rapidly inside the young grain and replaces its contents and blackens it. The diseased grains are covered over for some time with the remains of the "husk," which finally is burst, when each diseased grain becomes a "sooty" mass, which consists of the *spores* of the fungus (see Fig. 1).

The method of prevention, in the case of "Covered Smut," consists in killing the spores sown with the barley seed.

2. "LOOSE SMUT."—The fungus which causes this disease is known as *Ustilago nuda* (Jens.) Kellerm et Sw. The diseased barley plants produce their ears a little earlier than the healthy plants; the "smutted" ears produce a powdery mass of *spores* which are blown by the wind into the open flowers of the healthy ears in the neighbourhood. The young grains of these flowers are infected at once by these *spores*. The fungus, however, does not prevent the grain forming in these ears; nevertheless each grain is diseased and contains inside it the "spawn" of the fungus, although it has no external appearance of being diseased. When such grains are sown the

next season, the "spawn" of the fungus begins to grow at the same time as the seed sprouts, and grows up inside the stem, causing the plant to flower prematurely and to produce "smutted" ears (see Fig. 2).

*The method of prevention, in the case of "Loose Smut," consists in obtaining uninfected seed from a healthy crop.**


b 6 rows : 108 diseased plants b
Untreated
a 6 rows : 202 diseased plants a
b 6 rows : 116 diseased plants b
Sweated
a 6 rows : 166 diseased plants a
b 6 rows : 74 diseased plants b
Bordeaux Mixture
a 6 rows : 106 diseased plants a
b 6 rows : 16 diseased plants b
Copper Sulphate
a 6 rows : 19 diseased plants a
b 6 rows : 2 diseased plants b
Formalin
a 6 rows : 1 diseased plant a

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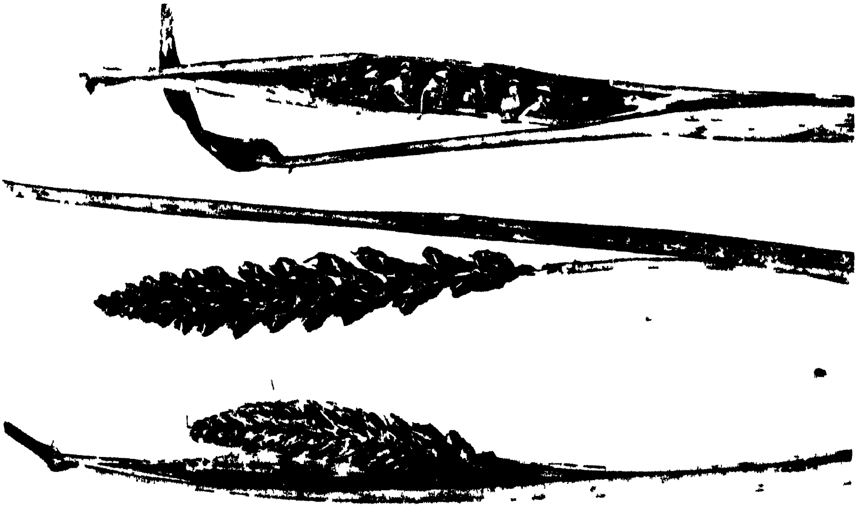
* See also description of "hot-water treatment" in article at p. 1417.—*Ed*



Losses Caused by "Covered Smut."—It is obvious that if a considerable percentage of ears is affected by "Smut" a direct loss to the farmer occurs. In addition to this, depreciation of the quality of the crop may result. A complaint of loss by barley "smut" was made to us during 1916 by Mr. Allington Collard, farming at Reculvers, East Kent. Mr. Collard wrote: "The barley is Archer's Stiff Straw Chevalier, a good-class malting barley; it is one of the best cropping barleys that I know. It is very similar in growth to the Long-eared Nottingham, and I consider both varieties rather more susceptible to 'smut' than some others. Of course, a severe attack decreases the yield per acre. Maltsters object to smutted samples because, as I understand, it causes a highly-coloured malt unsuited for pale ales. I have never heard of any other deleterious effect, and for brewing dark beers it is just as good as any other, I consider; but, of course, the buyers make a lever of it to reduce price. If a crop with 'smut' can be harvested in a really dry condition the barley will not be coloured, as it blows away; it is when there is a certain amount of moisture that the 'smut' adheres to the clevel, spoiling the colour." The firm of brewers who undertook the "sweating" of some barley seed (referred to below) wrote: "We are sorry to say that 'smut' seems to be getting more prevalent each year, and noticeably so in bad seasons."

Investigations showed that the trouble was due almost entirely to the "Covered Smut," the number of plants attacked by "Loose Smut" being negligible. Mr. Allington Collard being willing to give assistance, the following experiment was devised and carried out in 1917, the aim being to treat the barley seed—which had been saved from the "smut"-affected crop of 1916—in various ways so as to kill, if possible, the *spores* of the "smut" fungus adhering to it.

Description of the Experiment.—The seed used was treated in four different ways: (1) copper sulphate; (2) Bordeaux mixture; (3) formalin; (4) "sweating"; with (5) a control.

(1) *Copper Sulphate* ("bluestone").—This method of treatment is a very old and well-known one, and is not uncommonly employed by farmers in "pickling" seed wheat as a remedy for "bunt" or "stinking smut." Various strengths of a copper sulphate solution have been recommended, ranging from 0·5 per cent. to 10 per cent.; it was decided to use in the present experiments a 2·5 per cent. solution, *i.e.*, ¾ lb. copper sulphate to 3 gal. water. This solution, made in a wooden

pail, was sprinkled over 4½ bush. of the seed spread on the floor, and the whole well mixed, the liquid being thoroughly brushed in by means of a broom, so that practically every grain was wetted.

(2) *Bordeaux Mixture.*—This was prepared by slaking ½ lb. quicklime (in lumps) and making up to about 3 gal., then adding ½ lb. copper sulphate dissolved in 1 pt. of water. The mixture was then sprinkled over the seed and brushed in as in the case of the copper sulphate solution.

(3) *Formalin.**—The floor of the barn was disinfected by brushing it over with formalin solution at the rate of 1 pt. of formalin to 5 gal. water; 30 gal. of water were placed in a tub and 1 pt. of formalin added. The seed (2½ bush. at a time) was submerged in this and allowed to remain there 20 to 30 minutes; meanwhile many of the black, diseased grains rose to the surface and were skimmed off. The solution was poured off and the grain placed in a heap covered with sacks (the sacks having been sterilised by soaking them in the same formalin solution as used for the seed) and left for 8 hours—then spread out to dry.

This formalin treatment for the "smut" diseases of cereals is much employed by the progressive farmer in the United States, where special machinery has been devised for treating the seed. Oats have been treated at the rate of 500 bush. an hour, by throwing the formalin solution, by means of a steam pump, against the grain as it falls through elevators arranged with deflectors so as to give proper mixing. About 100 gal. of the solution are used for each 500 bush. of grain.

(4) "Sweating."—This consisted of loading the barley on to a malt kiln, the grain being loaded to a depth of 20 to 24 in. Heat was then applied by means of the kiln fire and the grain was raised to a temperature not exceeding 100° F.† This heat was maintained from 24 to 30 hours, during which time the grain was turned twice, and at the expiration of the time was ready for unloading.

(5) "*Control.*"—For the "control" plot the seed was untreated.

Germination tests in duplicate were made of the treated and untreated seeds, 100 seeds being used in each test, with the following results:—

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* "Formalin" is the trade name for a 40 per cent. solution, in water, of the gas formaldehyde.

† With some maltsters the heat is raised to 105° F. or 107° F.

	A. Per cent.	B. Per cent.
Untreated	99	99
"Sweated"	99	99
Bordeaux mixture	99	99
Copper sulphate	98	99
Formalin	98	97

It will be seen from these figures that although the vitality of the seed was slightly reduced by treatment with formalin the difference was so small as to be practically negligible.

The various lots of seed were drilled,* at the rate of 2 bush. 2 gal. to the acre, in a 9-acre field, the plots being arranged in the following order :—

Formalin	2 acres.
Copper sulphate	2 ,,
Bordeaux mixture	2 ,,
"Sweated"	2 ,,
Untreated	1 ,,

The length of the plots was 46 rods, omitting the headlands which were drilled with the seed left over from the various plots after completing the last full row possible in each plot. When one plot was finished the drill was emptied before the seed for the next plot was put in. Between adjacent plots one furrow was left undrilled, in order to mark off the plots and to serve as a pathway across the field from which the plots could be examined. (See plan on p. 1390.)

The examination of all the plots was made towards the end of August, the following method being adopted. A counting was made of the plants with smutted ears growing in the six rows along each side of each plot (see *a* and *b* in the plots shown in the plan on p. 1390). The number of diseased plants found in these rows was as follows :—

Formalin	*a*	1	3
	b	2	
Copper sulphate	*a*	19	35
	b	16	
Bordeaux mixture	*a*	106	180
	b	74	
"Sweated"	*a*	166	272
	b	116	
Untreated	*a*	202	310
	b	108	

The width of the drill being 10½ in., the width of the strip examined at each side of the plot was 5 ft. 3 in. Since the length of the plot was 46 rods, it follows that in each plot the diseased plants were counted over two areas, each measuring just over $\frac{1}{10}$ acre—an area large enough to yield an approximate estimate of the amount of disease in the plots.

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* If the drill has been used previously with infected seed it must be sterilised by being washed over with a solution of formalin (1 pint to 5 gal. of water).

Conclusions.—(1) Steeping the barley seed in formalin and skimming off the black diseased grains that rise to the surface are completely successful in preventing "Covered Smut."

(2) Sprinkling ("pickling") the seed with a 2·5 per cent. solution of copper sulphate ("bluestone") is less effective.

(3) Treatment of the seed with Bordeaux mixture is of little use.

(4) "Sweating" the seed on a malt kiln gives no protection against the disease, the number of "smutted" plants produced being practically the same as with the untreated seed.

NOTE.—*See also article at p. 1417, which has been issued as Food Production Leaflet No. 31.*—ED.

THE EFFECT OF WEEDS UPON CROPS.

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THE question of the harm wrought by weeds is one of the greatest possible interest to the farmer. The fact that weeds are most mischievous is never denied by anyone, but the way in which they work their mischief is still a matter of controversy.

Three main lines of possibility exist :—

(1) Weeds may do damage by utilising so much food and water from the soil that the crop plants suffer from a greater or less degree of starvation.

(2) Weeds may shade the crop above ground, so robbing it of much of the sunlight that is absolutely essential for proper growth.

(3) The weed roots may excrete toxic substances which are inimical to the growth of the crops.

At the present time (3) is attracting a great deal of attention and some authorities claim that toxic excretions play a very great part in the matter. With a view to ascertaining whether this is the case, or whether the mere competition below and above ground for food, water and light is sufficient to account for all the harm wrought, pot- and water-culture experiments have been carried out at Rothamsted during the last four years.* Poppy, spurrey, black bent and charlock have been grown together with wheat and barley, various combinations of rates of seeding being adopted in order to introduce varying degrees of competition. Poppy and spurrey are typical sandy land weeds, and hence in the later experiments they have been grown on sandy soil supplied from Woburn by Dr. Voelcker. Black bent (*Alopecurus agrestis*, L.) and "charlock" (*Brassica alba*) are more at home on heavy land, and they have been grown on Rothamsted soil, which is a heavy clay loam. In 1913 and 1914, however, all the experiments were carried out on Rothamsted soil, with the addition of a percentage of sand to some pots to lighten the texture.

Experiments, 1913–1914.—The soil for the experiments was sifted to remove stones and lumps and was then thoroughly mixed with the requisite proportion of sand on a cement floor, in order that the sample might be as uniform as possible throughout. After this a weighed quantity was filled into each pot, the seeds were sown, and a measured amount of water was applied to moisten the soil nicely. Some pots were sown with wheat only, in some half the wheat was replaced by weed, and in others the whole of the wheat was replaced by weed, so that the rate of seeding was comparable in all cases. This enabled observations to be made upon—

(*a*) Competition of wheat with itself (pots with wheat only).
(*b*) Competition of wheat with weed (pots with wheat and weed).
(*c*) Competition of weed with weed (pots with weed only).

Observations were made throughout the growing period, and when the weeds began to go to seed the crops were cut, dried in a steam oven for several days, and the weights of the dry matter obtained.

A comparison of the results obtained showed that the association of any of the weeds with wheat had a great influence upon the growth of both. When the wheat or the weed was grown alone, as indicated above, the plants were quite healthy and made satisfactory growth. When, however, a combination was effected, the results varied according to the species that was grown with the wheat.

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* W. E. Brenchley, "Effect of Weeds upon Cereal Crops". *New Phytologist*, XVI., pp. 53–76.

Poppy, black bent and spurrey were seriously handicapped when they were associated with wheat, and the individual plants produced much less dry matter and fewer flowers or fruiting spikes.

This poor development of the weeds gave the wheat plants more space, so that the latter were able to make from 60 to 85 per cent. more growth, plant per plant, than in the pots in which the weeds were replaced by extra wheat plants. It must be emphasised that the comparison is between (*a*) Wheat + wheat, (*b*) Wheat + weeds, and (*c*) Weeds + weeds, and that in this particular experiment no inference is drawn as to the effect of introducing weeds into an ordinary wheat crop sown with the usual profitable rate of seeding.

Although spurrey did not develop much when grown with wheat, still the associated wheat did not make quite so much increase in growth as the wheat with poppy, the increase being 65 per cent. against 85 per cent. This is probably due to the fact that spurrey grew well at first, and straggled about, as its habit is, covering the surface of the ground, so that in the early stages of growth the young wheat plants were robbed of a good deal of light. This would cause an initial check to growth from which the plants did not entirely recover all through, so that they did not benefit to the full from the increased space available.

With charlock, however, the case was different. The amount of growth made by both wheat and charlock was much the same whether the plants were grown alone or in association, indicating that the competition between the charlock plants was very similar to that between the wheat plants, and one could replace the other without causing much alteration in relative growth.

These experiments, therefore, showed that the presence of *extra wheat plants* caused far more depreciation in individual growth than the presence of spurrey, black bent or poppy—*i.e.*, the competition of wheat with wheat was apparently greater than wheat with weed, in these cases, in this heavier soil. With charlock, however, a certain balance of the competition seemed to exist, charlock and wheat acting equally upon one another.

1915 Experiments.—In order to compare the effect of the competition induced by heavy seeding of either weeds or crops alone with that caused by the action of weeds upon crops a set of pots with light and heavy seeding was arranged thus :—

Wheat + wheat.
Wheat.
Wheat + weed.
Weed.
Weed + weed.

Woburn soil was used in this case for poppy and spurrey, so that these plants had the full advantage due to congenial soil, and their growth was correspondingly better than in the heavier soil used previously.

WOBURN SOIL.

Total Dry Weights of Crops from Six Pots.

Crop		*Weed.*	
Grammes			*Grammes.*
		Poppy	46·7 (5 pots)
		Poppy + Poppy	54·9 (5 pots)
25·8	Wheat +	Poppy	16·9
41·1	Wheat		
40 1	Wheat + Wheat		
10·0	Wheat +	Spurrey	62·2
		Spurrey + Spurrey	86·9
		Spurrey	70·5

With double seeding both poppy and spurrey made rather more total growth than with single seeding, but the increase was comparatively slight, and consequently the individual plants in the heavily-seeded pots were much smaller than in those lightly seeded. Wheat, on the contrary, made approximately the same total growth in both cases with no increase with double seeding, showing that the competition of wheat with wheat in the light Woburn soil was more even than that of the weeds with themselves. This is probably due to the limited amount of available food which was fully utilised by the wheat even with the light sowing. As quite as much total growth was made with the double seeding in these circumstances, it seems evident that the factor limiting growth in the latter case was that of shortage of food, and that no toxic action of one plant on the other was in play. If toxic action had been in force, one would have expected less growth with double seeding than with single.

The presence of spurrey with wheat in this experiment seriously hindered the growth of wheat. The spurrey was in soil that was most favourable to growth and the wheat in an unfavourable soil, so that the wheat was almost swamped by the superabundant growth of spurrey, while the weed was not very seriously influenced by the wheat. On the other hand poppy made very poor growth, so that its competitive action was much reduced, and consequently, owing to the increased space and food available, the wheat with which it was associated was able to make more growth, plant per plant, than that which had been grown with the effective competition of extra wheat plants.

Black bent and charlock in the Rothamsted soil behaved rather differently from the weeds in the Woburn soil.

ROTHAMSTED SOIL.

Total Dry Weights of Crops from Six Pots.

Crop Grammes.		*Weed.*	Grammes
		Black bent	33·4
		Black bent + Black bent	93·8
88·7 ..	.. Wheat +	Black bent	0·1
85·5 ..	.. Wheat		
97·6 ..	Wheat + Wheat		
66·7 ..	.. Wheat +	Charlock	29·0
		Charlock + Charlock	94·9
		Charlock	86·1

The soil was more favourable to the growth of wheat, so that the single seeding did not fully utilise the available food, and rather more growth was obtained with double seeding—and again no evidence of toxic action was obtained. Black bent did much better with double than with single sowing, and it may be suggested that this plant only flourishes with autumn sowing and when it is able to obtain a certain amount of shelter from other plants in the early stages. With the spring sowing adopted in the experiment the black bent was unable to make any stand against the competition with wheat, so that the wheat in this case was as good as that grown by itself. In this experiment the charlock was more adversely affected by the wheat than in previous years, the wheat itself being less affected by the charlock.

Altogether, a full consideration of the results obtained gives no evidence that any factor is at work other than that of simple competition for food and light. Wheat and other crops grown by themselves are able to make far better growth, plant per plant, than when they are hampered by the presence of weeds, so that efficient weeding makes for increased profit. A close comparison of all the figures obtained indicates that a given area or volume of soil is only able to support a certain limited amount of growth, and the distribution of this growth over crops and weeds depends largely upon the thickness of the seeding, the suitability of the soil to the various plants, and the cultural conditions prevailing. No evidence of toxic action, either of one plant on another of the same species or of a different species, was obtained from these experiments. Similar results, which need not be detailed here, were obtained from water culture experiments.

1916 Experiments.—A further point was followed up in 1916. If toxic substances were excreted by the roots of plants, it might be expected that they would exert a deleterious action on the growth of similar plants the following season. To test this the soil used in 1915 was utilised again. It was tipped out pot by pot, thoroughly mixed up, and returned to the pots. Barley was used instead of wheat as the crop plant, and the same species of weed was sown in each pot as in the previous year. If toxic substances had been left in the soil, larger amounts would have been present in the pots which had carried a heavy crop in 1915, and consequently a greater harmful action, associated with a decrease in growth, might have been expected. Similarly, pots which bore a light crop in 1915 would be expected to carry a relatively heavier crop in 1916, as less toxin would be present. As a matter of fact, no correlation could be observed at all, as some pots bore heavy crops and others light crops in both years, and in other cases no definite relation existed. In the absence of such correlation it seems evident that no toxin capable of remaining unchanged from one season to another was present in the soils.

General Conclusions.—All things considered, in the light of these experiments it seems probable that the essential factor in the relation of crop with weed is that of competition for food, space and light, rather than that of toxic excreta from the roots. There is no evidence, and indeed no indication, that any direct toxic action comes into play. It is evident that the mere competition of plant with plant, irrespective of species, has much to do with development and that the time and duration of competitive check are the chief factors involved. Negative results are necessarily inconclusive, so that it is still impossible to say definitely whether or not such plants as black bent are harmful to crops in any other way than that of direct "vegetative" competition. It is clear that such competition is more potent than is generally realised. In the experiments all the crop plants were at least 4 or 5 in. apart, and the effects of overcrowding were most obvious. In a field where weeds are at all prevalent the plants are still more closely placed, and the struggle must be still keener. Even when weeds are suppressed by cultivating and hoeing the roots remain in the soil to a large extent, and those of the perennials at least continue functioning in a normal way, though to a less degree; nevertheless, such suppression of weeds is all to the advantage of the crop—the removal of the aerial competition enables the crop to forge ahead far more rapidly in spite of what the roots of the weeds may be doing in the soil.

If the weed roots really excreted a poisonous substance one would have expected that the presence of weeds in a thinly-sown wheat crop would do more harm than the presence of *extra* wheat plants, *i.e.*, that thinly-sown wheat, if encumbered with weeds, would make less individual growth than thickly-sown wheat that is kept free from weeds. Instead of this the reverse happened in nearly every case throughout the experiments, and thickly-sown wheat made less growth, plant for plant, than thinly-sown wheat in the presence of weed, indicating that the competitive action of wheat with itself was stronger than that of the weeds. When, however, wheat was sown thinly, and kept free from weeds it made much stronger growth than when weeds were allowed to flourish. This points to the fact that the vital factor in competition is the mere presence of other plants, be they what they may, the strength of the competition depending upon the amount of growth of the associated plants. Thus, up to a certain limit, two plants cannot make such good individual growth in a given restricted area as one plant can, and therefore the best development of crops is to be obtained by reasonably thin sowing combined with entire freedom from weeds.

Although these experiments have given no indication of the excretion of toxins by plant roots, other investigators along the same lines have reached other conclusions.

Pickering has stated that toxins are produced in the soil and that the toxin formed by any individual plant will affect that individual itself. If this be the case, a fresh field of inquiry is opened up, and it is conceivable that results may be obtained which will ultimately reconcile the discrepancies that exist at present. Nevertheless the toxins. if formed, are so elusive that their action is easily masked by the many other factors of competition, such as root interference, crowding of aerial parts, and deficient quantities of available plant food.

THE CONTROL OF THE APPLE CAPSID BUG BY SPRAYING.

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THE experiments here recorded are a continuation of those carried out during the season of 1916 by Fryer and Petherbridge, an account of which appeared in this *Journal* for April, 1917. The season of 1916 was very unfavourable for spraying experiments, but in spite of this spraying with "soft-soap and nicotine" gave very beneficial results. This season's experiments were designed to determine the most suitable time for spraying, and also the number of sprayings necessary to produce marketable fruit.

At the beginning of the season it was not known that *Plesiocoris rugicollis* was the only Capsid which caused the marked damage to apples, and as a consequence the sprays were designed to control not only this bug (which was known to cause damage) but also other Capsids which hatch at a later date—notably *Orthotylus marginalis*, which was also thought to be a possible culprit, but which has since been shown not to cause any marking of the fruit.

The Spraying Fluids Used.—As "soft-soap and nicotine" was found the most efficacious last year, it was at first decided to use this insecticide only; later, however, a "soft-soap and pyridene" spray was included as being of potential value, and on one plot ammonia-soft-soap alone was tried. Messrs. Clayton and Young set aside one of their orchards for these experiments and the writer wishes to thank these gentlemen for the great assistance they gave.

Influence of Season.—The season of 1917 was a very favourable one for carrying out spraying experiments and cannot be regarded as an average one. The results will, however, show what is possible when apple trees are sprayed for Capsids under suitable conditions. The buds were late in bursting owing to the continued cold weather; later on warm weather set in and the buds opened quickly. These conditions also retarded the hatching of *Plesiocoris rugicollis*, but apparently shortened the hatching period. This was favourable for spraying, as when the first spraying was done all the *Plesiocoris rugicollis* had hatched. In a season when the hatching period is prolonged the first spraying will have to be delayed in order to have the maximum effect, or a second spraying will be expedient in order to kill those bugs which hatch after the first spraying

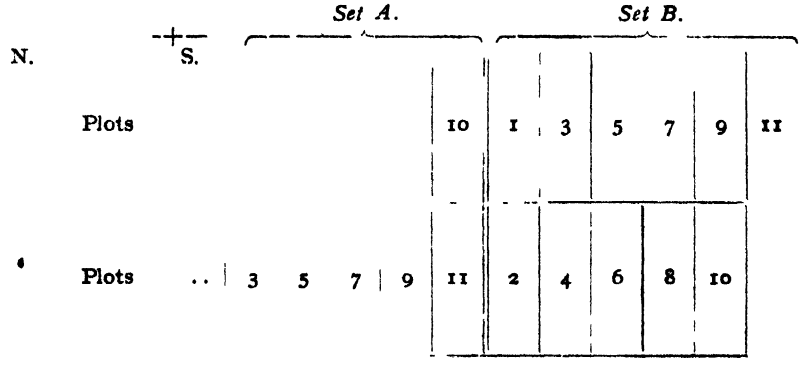
In 1917 the first signs of damage were noticed on 7th May (in the laboratory under warmer conditions some hatched out on 5th May). In 1916 a few newly-hatched bugs were found on 25th April, whereas in 1913 Fryer records them as hatching before 14th April. From this it is clear that the time of spraying should vary according to the season.

Observations made in 1916 and 1917 suggest that the date of the hatching of the bugs may be almost uniform with the date of flowering of the apple. In 1916, when *Plesiocoris rugicollis* was first noticed on 25th April, the trees on which they hatched were in full bloom about 12th May—an interval of 17 days. In 1917, when this bug was first noticed on 7th May, the trees were in full bloom on 23rd May—an interval of 16 days. From observations made then it was found that *Plesiocoris rugicollis* started hatching on 6th May and were all out by 13th May. This is probably a shorter hatching period than the average, and growers would be wise to allow longer than this, if practicable, before beginning to spray.

From the above observations it will be seen that the first spraying on 17th and 18th May was applied after all the *Plesiocoris rugicollis* had hatched. The marking of the fruit was first noticed on 28th May, *i.e.*, one day before the last spraying was done.

Plan of the Experiments.—The experiments were carried out in the "wash-dyke" orchard at Walton Highway, near Wisbech. The trees were ten years old from planting, but they had made rather poor growth and were of a suitable size for spraying easily. The trees were rather thick and consequently harder to spray than trees kept thinner. All the trees were badly attacked by Capsids in 1916.

The following is a plan of the plots, on which each row consisted of 20 trees and each plot of 10 trees :—



Set A.—Trees alternately Lady Hollendale and Early Victoria (Emneth Early).

Unless otherwise stated the spray fluid used was as follows :—

Soft-soap	15 lb.
Nicotine (98-99 per cent)	8 oz.
Water	100 gal.

Plot 2.—Sprayed on May 17th.
,, 3.— ,, ,, 17th and 29th.
,, 4.—Unsprayed.
,, 5.—Sprayed on May 29th
,, 6.— ,, ,, 17th.
,, 7.— ,, ,, 17th and 23rd.
,, 8.— ,, ,, 17th, 23rd and 29th.
,, 9 —Unsprayed
,, 10.—Sprayed on May 17th and 29th with—

Soft-soap	15 lb.
Commercial pyridene	25 oz.
Water	100 gal.

,, 11.—Sprayed on May 17th and 29th with—

Soft-soap	15 lb.
Commercial pyridene	37½ oz.
Water	100 gal.

Set B.—Trees alternately Lord Grosvenor and Grenadier.

Unless otherwise stated the spray fluid used was as follows :—

Soft-soap	15 lb.
Nicotine (98–99 per cent.)	8 oz.
Water	100 gal.

Plot 1.—Unsprayed.
,, 2.—Sprayed on May 18th.
,, 3.— ,, ,, 17th and 29th
,, 4.—Unsprayed
,, 5.—Sprayed on May 29th.
,, 6.— ,, ,, 18th.
,, 7 — ,, ,, 17th and 23rd.
,, 8.— ,, ,, 19th with—

Ammonia-soft-soap	20 lb.
Water	100 gal.

,, 9.—Unsprayed.
,, 10.—Sprayed on May 18th, 23rd and 29th.
,, 11.— ,, ,, 17th and 29th with—

Soft-soap	15 lb.
Commercial pyridene	37½ oz.
Water	100 gal.

Before spraying the trees a band of a sticky substance was applied to each tree about 18 in. from the ground to prevent any Capsids which fell from the trees from ascending. A few Capsids were stopped from ascending by this means. On some large Lord Derby trees near the number of Capsids which were prevented from ascending were much larger, an average of about 20 per tree. They consisted partly of *Plesiocoris rugicollis* and partly of a harmless species—*Psallus ambiguus.*

Method of Spraying.—The trees were sprayed by men who previously had little experience, but on being shown how to spray they did the work remarkably well. Headland hand-pumps, giving a pressure of about 60–70 lb. per sq. in., were used, and two hoses were used on each pump. A right-angled nozzle with a medium sized opening was used on the lances, the nozzles were directed *downwards* on the shoots, and then moved up and down each shoot at a distance of about 6–12 in. from the shoots. By this method more of the spray fluid goes into the expanding buds where the young Capsids usually feed. At the time of the first spraying the corollas of the flowers were showing, but the flowers did not open for 5 or 6 days.

On 17th and 18th May a strong, cold, north-easterly wind was blowing, and consequently a lot of the spray fluid was wasted About 3 gal. of wash per tree were used at this first spraying. A fine rain fell at intervals during the spraying. At the subsequent sprayings, which were done on less windy days, only 2 gal. of fluid per tree were necessary.

On Plots A 2, A 6, A 8, A 10, B 3, and B 7 dyke water was used for the first spraying, and after the spraying it was noticed that the leaves were slightly scorched. The other plots, on which Wisbech Corporation water was used, were not scorched, so that in all subsequent sprayings Wisbech Corporation water was used and no scorching of the leaves resulted.

Results.—A short time after spraying the trees were examined and large numbers of dead *Plesiocoris* bugs were found, and a few living ones. All the bugs which were wetted by the soft-soap and nicotine were killed, and this shows the need for thorough spraying. It is necessary to spend several minutes on each tree of the size sprayed in this experiment in order to ensure the wetting of most of the trusses. The soft-soap and nicotine killed the bugs very quickly, but the soft-soap and pyridene did not kill so quickly, and the ammonia soft-soap did not kill such a large percentage.

The second spraying was done on 23rd May, when the Lady Hollendales, Early Victorias and Lord Grosvenors were in full bloom, and the Grenadiers were nearly so. After the spraying all the petals were badly scorched, but there was little evidence to show that the setting of the fruit was prevented (see yields of Plots A 7, A 8, B 7, and B 10).

The third spraying was done on 29th May, after the fruit had set, and at this date some of the apples on the plots which had not been sprayed had been marked by the young Capsids.

A record of the blossoming of each tree was kept, as it was thought that the weighings of the fruit from trees which had a similar amount of blossom would serve to demonstrate the effect of the sprayings.

Where possible two trees of each variety were chosen in each plot; the apples from these trees were weighed, and from this the average weight per tree was ascertained. At the time of weighing the number of apples on the unsprayed plots was less than on most of the sprayed plots. This was in some cases partly due to the number of small marked apples which fell off; but even on the sprayed plots a lot of small apples fell—a large percentage of them unmarked—and a few large apples which were blown off by the wind, rotten before the time of weighing, hence not included. It is important to remember that if the number of apples on the unsprayed trees had been as many as those on the sprayed trees then the latter would still give a larger yield, as the attacked apples do not grow to their normal size when badly marked.*

Observations on the amount of damage done by *Plesiocoris rugicollis* throughout the season showed marked differences due to the spraying.

SET A.—*Lady Hollendales.*—In Set A the Lady Hollendales on the unsprayed plots showed much more marking of the leaves than on the unsprayed plots, but the damage did not seem to check the trees much. Plot 5, which was sprayed after the fruit was set, was also badly marked on the leaves. The effect of the treatment on this variety was very apparent at all stages of the growth of the apples, and especially so when they began to colour, as the apples on the unsprayed plots were so marked that they were of a dull brown colour, whereas those on most of the sprayed trees were of a bright shining red. The unsprayed plots carried a very large percentage (over 80 per cent.) of marked apples, and most of these were badly marked (see Fig. 8). On Plot 5, which was sprayed after a small amount of the marking had been done, the marking was less than on the unsprayed plots (see Fig. 7l). Plots 2 and 6, which were sprayed once only before bossoming, showed little marking (about 10 per cent.), whereas on those plots which were sprayed two or three times with soft-soap and nicotine it was not easy to find marked apples (see Figs. 1 and 2), and this is also true of Plot 11, which was sprayed before and after blossoming with a strong solution of soft-soap and pyridene. Plot 10, which was sprayed twice with a weaker solution of soft-soap and pyridene, carried about 20 per cent. of marked fruit. Unfortunately, the Lady Hollendales set badly and only the trees on the west side set at all well, so that it was difficult to compare the plots on this side with the plots on the other side by means of weighings. The table below shows the weight of apples picked from five consecutive trees situated at the west end of their respective plots, At the time of blossoming these trees were all marked as having nearly a full amount of blossom. The apples were graded into two classes. Large apples were classified as "Market Fruit," and small apples as "Bag Fruit." The market apples from the sprayed plots were of a better quality *in all cases* than those from the unsprayed plots, the former in some cases having no marked apples. The "bag fruit" from the sprayed plots sometimes consisted of small unmarked apples, whereas those from the untreated were always marked.

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* In addition to the damage by Capsids the trees were also attacked by Apple Blossom Weevil (*Anthonomus pomorum*) and also by caterpillars—mainly those of the Winter Moth (*Cheimatobia brumata*), but also a few of the Lackey Moth (*Malacosoma* (*Clisiocampa*) *neustria*) and of the Clouded Drab Moth (*Tæniocampa incerta*) The spraying apparently did not check the amount of Apple Blossom Weevil, but a large percentage of caterpillars was killed both by soft-soap and nicotine and also by the soft-soap and pyridene. This was very obvious some time after the spraying, when the remaining caterpillars had had time to do damage, but the number of caterpillars present was not sufficient to check the yield very much.

SET A.—*Lady Hollendale.*

Plot	Number of Sprayings	Date of Spraying	Market Fruit	Bag Fruit.	Total.
9	0	—	2	4	6
5	1	29th May (after blossoming)	3	0·5	3·5
7	2	17th May (before blossoming) 23rd May (at blossoming)	37	0	37
3	2	17th May (before blossoming) 29th May (after blossoming)	51	0	51
11	2	Soft-Soap and pyridene : 17th May (before blossoming). 29th May (after blossoming)	32	0·5	32·5

On the five trees mentioned the set was fairly good except on Plot 5. On the unsprayed plot (9) the set was nearly as good as on the other trees, but more apples fell from this tree. None of the other trees on the unsprayed plots carried as much as 6 lb. of fruit, whereas several other trees on the plots sprayed twice carried between 20 and 30 lb. of marketable fruit.

FIG 1—Lady Hollendale: sprayed twice; once before blossoming and once at blossoming

FIG 2—Lady Hollendale: sprayed twice; once before and once after blossoming

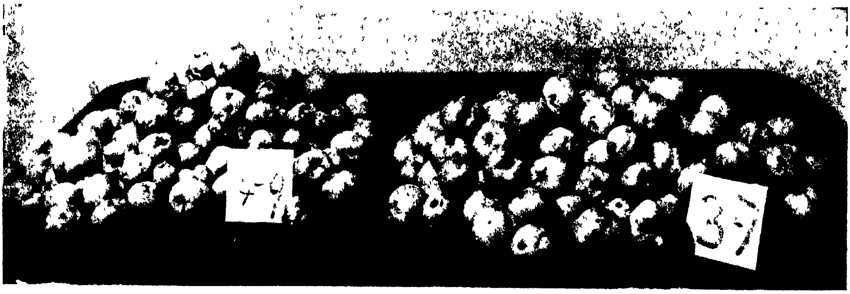

FIG 3—Lord Grosvenor: left, unsprayed; right, sprayed twice—once before and once after blossoming

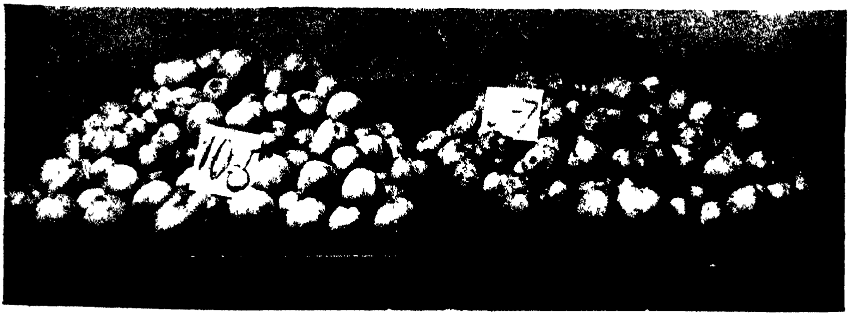

FIG. 4.—Lord Grosvenor: left, sprayed three times—before, at, and after blossoming; right, sprayed once before blossoming.

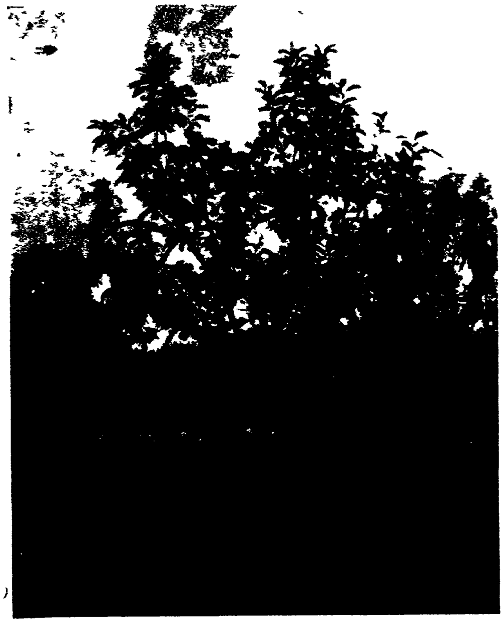

FIG. 5.—Grenadier: sprayed and showing normal growth.

FIG 7.—Lady Hollendale: sprayed once after blossoming

FIG. 8.—Lady Hollendale: unsprayed.

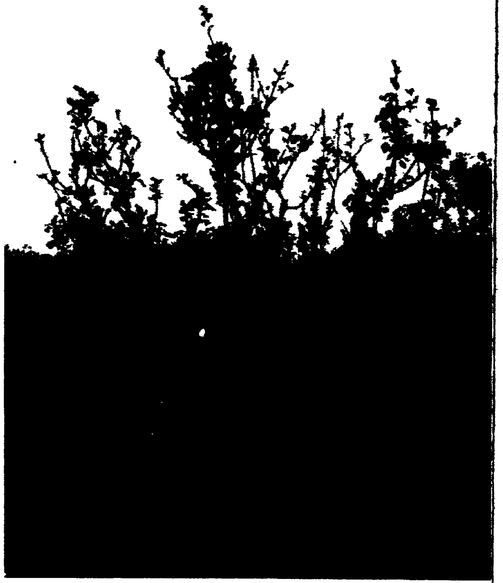

FIG 6.—Grenadier: in the same row as Fig 5, photographed on the same day, but unsprayed, and showing a severe check in the growth of the leaves due to *Plesiocoris rugicollis*.

Growers who saw these trees were easily convinced that "soft-soap and nicotine" and "soft-soap and pyridene" are very effective and profitable washes for reducing the damage done by Capsids.

SET A.—*Early Victorias.*—In Set A the Early Victoria (Emneth Earlies) which were sprayed before blossoming showed very little marking of the leaves as compared with the unsprayed plots. At the time of picking it was easy to select those plots which had been sprayed, as more than 75 per cent. of the apples on the unsprayed plots were marked, whereas none of the sprayed plots carried more than 20 per cent. of marked fruit. Plot 5, which was sprayed after blossoming, carried about 20 per cent. of marked fruit, as also did Plot 10, which was sprayed twice with a weak solution of soft-soap and pyridene. Plots 2 and 6, which were sprayed once only before blossoming, carried less than 10 per cent. of marked fruit. Plots 3 and 11, which were sprayed twice, carried very few marked apples, and on Plot 8, which was sprayed three times, many of the trees carried fruit without any markings The "market fruit" from the sprayed plots were all of a much better sample than

SET A.—*Early Victoria.*

Plot	Number of Sprayings	Date of Spraying	Market Fruit	Bag Fruit	Total
4	0	——	7	8	15
2	1	17th May (before blossoming)	38·5	4	42·5
5	1	29th May (after blossoming)	17	5	22
3	2	17th May (before blossoming) 29th May (after blossoming)	31	2	33
8	3	17th May (before blossoming) 23rd May (at blossoming) 29th May (after blossoming)	50	5	55
10	2	Soft-soap 15 lb, pyridene 25 oz, water 100 gal: 17th May (before blossoming) 29th May (after blossoming)	25	7	32
11	2	Soft-soap 15 lb, pyridene 37½ oz, water 100 gal: 17th May (before blossoming) 29th May (after blossoming).	54	5	59

those from the unsprayed plots, as the latter contained many apples that were marked and just marketable. The "bag apples" from the unsprayed plots were all marked, whereas those from the sprayed plots consisted partly of marked apples and partly of unmarked small apples, or entirely of unmarked small apples.

None of the trees on the unsprayed plots carried a bigger total weight of apples than 15 lb., whereas one of the trees on the plot sprayed three times carried 100 lb. of fruit.

SET B.—*Lord Grosvenor.*—These trees showed relatively the same effect due to spraying as regards the marking of the leaves. On the trees which were sprayed three times, Plot 10 (see Fig. 4, 10–5) the fruit was practically all clean; those sprayed twice (Plots 3 and 7) carried a few marked ones (see Fig. 3, 3–7); those sprayed once before blossoming (Plots 2 and 6) carried about 10 per cent. of marked fruit (see Fig. 4, 6–7) Plot 5, which was sprayed once only after blossoming,

SET B.—*Lord Grosvenor.*

Plot	Number of Sprayings	Date of Spraying	Market Fruit	Bag Fruit	Total.
1	0	——	16·5	18	34·5
4	0	——	13	12·5	25·5
9	0	——	13	4	17
2	1	18th May (before blossoming).	29 75	4·5	34·25
6	1	18th May (before blossoming)	31·5	3·5	35
5	1	29th May (after blossoming)	14	1	15
7	2	17th May (before blossoming) 23rd May (at blossoming)	28	1	29
3	2	17th May (before blossoming) 29th May (after blossoming)	28·5	4·5	33
10	3	18th May (before blossoming 23rd May (at blossoming) 29th May (after blossoming).	30	0·25	30·25
		Soft-soap 15 lb, pyridene 37½ oz., water 100 gal:			
11	2	17th May (before blossoming). 29th May (after blossoming.	27	3	30
		Ammonia-soft-soap 20 lb, water 100 gal:			
8	1	19th May (before blossoming)	19·5	11·5	31

carried about 15 per cent. of marked apples. On the unsprayed trees (Plots 1, 4 and 9) about 80 per cent. of the apples were marked (see Fig. 3, 4–9). It is interesting to note that spraying once after flowering was sufficient to prevent a large percentage of the marking in this set.

The unsprayed trees in this set carried a fairly good crop, although not so heavy as most of the sprayed plot. It will be seen that the crop on the unsprayed trees was not nearly such a profitable one.

SET B.—*Grenadier.*—These trees suffered much worse than the other varieties from the markings on the leaves. The attack was so bad that the trees on the unsprayed plots were easily distinguishable from those which had been sprayed before blossoming by the small amount of leafage present during the early season (cf. Figs. 5 and 6). It was not possible to show the effects of spraying by means of weighings, as none of the untreated trees set more than a few apples, and only on a few of the sprayed trees was there more than a stone of fruit, although there were considerably more apples on the sprayed than on the unsprayed trees.

It will be seen from the above results that spraying at the right time not only increases the value of the apples by preventing marking, but also increases the yield considerably. In the case of the Lady Hollendales the increase in yield and quality was phenomenal. In the case of the Early Victorias one spraying more than doubled the yield, and in the case of the Lord Grosvenors the increase in yield due to spraying was considerable.

Further Experiment.—In addition to the above experiments several rows, consisting of alternate trees of Early Victoria and Grenadier, were sprayed on 19th May with the following washes :—

Plot C.—Soft-soap	.. ..	10 lb.
Nicotine (98–99 per cent.)	.. ..	8.75 oz.
Water	.. ..	100 gal.
„ *D.*—Ammonia-soft-soap	.. .. ..	7½ lb.
Nicotine (98–99 per cent.)	.. ..	7½ oz.
Water	.. ..	100 gal.

On both these plots there was a fairly good crop of Early Victorias, of which not more than 10 per cent. of the crop was marked by Capsids. In another orchard close by, trees which were well sprayed with a heavy " lime " wash when the buds were bursting suffered badly from Capsid attack.

Cost of Spraying.—The cost of the soft-soap and nicotine used in these experiments was 11*s.* 6*d.* per 100 gal. (In normal times it should be cheaper than this.) The cost of labour worked out at rather less than 1*d*. per tree. The amount of wash used per tree varied from 2 to 3 gal., according to the amount of wind, so that the total cost of spraying each tree once varied from 3¾*d*. to 5*d*. A study of the increased yield and value of the sample should convince growers that this is a very profitable investment, and it must be remembered that after the spraying the trees will not be liable to such a bad attack next season.

As a result of these experiments Messrs. Clayton and Young hope to spray with "soft-soap and nicotine" all their trees which are attacked.

General Conclusions.—From these experiments it is evident that a soft-soap and nicotine spray is very effective in preventing damage to apples by Capsid bugs in a favourable season.

It must be remembered that the spraying must be very thorough in order to kill a large percentage of the bugs, and also that the wash should be applied, if practicable, after all the bugs have hatched. Many growers are anxious to start spraying as soon as they see signs of Capsid damage in order to finish the whole of their trees before the damage to the fruit is done; but they should remember that, even if they kill all the bugs which have hatched, those bugs which hatch later do considerable damage to the fruit unless a second spraying is done.

The best time for spraying varies with the season, but, as a rough guide, about 10 days after the first markings of the leaves by the Capsids will be the best time to begin, as then most or all of the Capsids will have hatched. This date will usually be about a week before blossoming. Large growers who are unable to spray more than once in a season should continue to spray most of their varieties throughout the blossoming period, and for several days after the marking of the fruit has begun. Growers who are able to spray twice should do so in the case of a bad attack once before blossoming and once just after blossoming. When the attack is reduced one thorough spraying will probably be sufficient to keep this pest in check in most seasons.

The amount of soft-soap necessary to make the wash effective will vary with the hardness of the water. With soft water 10 lb. per 100 gal., or even less, will be sufficient; but with hard water it may be necessary to use more than this. The amount of nicotine in the wash should be from 7 to 8 oz. per 100 gal.

As the eggs are laid in the twigs care should be taken not to plant nursery stock from an infested area in a non-infested area.

NICOTINE-PARAFFIN EMULSION.

A. H. LEES, M.A.

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As insect pests increase in number, and labour becomes scarcer and more and more expensive, the need for reducing the number of spraying operations becomes more urgent.

Broadly speaking, two classes of insect pests have to be controlled by the fruit grower, *i.e.*, those that obtain their food by chewing and those that obtain it by sucking. In the first case the plant material is eaten and solid matter enters the insect's stomach ; in the second case the plant is sucked and only liquid matter is absorbed.

For the biting class of insect, such as the winter moth caterpillar, lead arsenate is quite sufficient. For the sucking class, such as aphis, red spider, apple sucker and capsid bug, it is necessary to use a contact wash. Contact washes usually contain soap in order to give a certain amount of wetting power to the fluid. It is impossible to use lead arsenate with most contact washes, since a chemical reaction takes place between the two bodies, resulting in curdy masses and a loss of wetting and killing properties. A compromise can sometimes be made by combining nicotine and lead arsenate, but owing to the poor wetting power it necessitates much fluid being used with a high pressure behind it. This means, of course, great expense owing to the high price of nicotine. In addition, the great force necessary is the very opposite of what is required for lead arsenate spraying, where the desideratum is a misty application of the material so as to ensure the leaves being covered with a host of minute drops.

From these considerations it would appear that lead arsenate is unsuitable for use in a combined spray.

The only alternative to a stomach poison is to make the contact wash effective enough to kill chewing insects.

Nicotine by itself can be made to do this, but only at strengths that are prohibitive alike from danger of burning and expense. The first point, therefore, is to obtain some body or mixture of bodies that will greatly increase the killing power of dilute nicotine. To do this great wetting and penetrative power is necessary in order to carry the poison well into the insects body through the breathing pores.

In the author's view the most satisfactory agent is a 2 per cent. paraffin emulsion. Of the many possible emulsions of paraffin and soap this gave the maximum of wetting power with the least amounts of soap and paraffin, and the least tendency to burn.*

Its great wetting power may be judged by the fact that it thoroughly penetrates the white summer stage of American Gooseberry Mildew and the waxy threads of Woolly Aphis. Used alone this emulsion is capable of killing aphis and a good many, if not all, suckers. It penetrates flower trusses of the apple even if infested with suckers, and will wet leaves spun together by winter moth caterpillar if there is any way at all into the mass.

It is, by itself, a fairly good contact insecticide. It is not, however, potent enough to kill capsids, caterpillars or beetles. Nevertheless, if ½ of 1 per cent. of nicotine is added to it its power is greatly increased.

The formula of the spray fluid is then as follows :—

Soft soap	20 lb.
Paraffin	2 gal.
Nicotine	½ lb.
Water	100 gal.

Directions.—Dissolve the soft soap in 5 to 10 gal. of boiling water. Emulsify the paraffin in the hot soft-soap solution by taking up the paraffin in a garden syringe with a rose attached, a syringeful at a time, and squirting it violently into the soap solution.

Add the nicotine and dilute to 100 gal. (*i.e.*, adding 90 to 95 gal. as required).

For a 40-gal. paraffin barrel the formula is :—

Soft soap	8 lb.
Paraffin	6½ pt.
Nicotine	3 oz.
Water	40 gal.

Stir the mixture well before use.

This mixture has been tried on the small scale against various insects and has proved successful.

Capsids.—These are killed where thoroughly wetted.

Cabbage Caterpillars.—The larvæ of the Large White Butterfly were sprayed with the mixture. They remained three days on the leaf motionless and fasting and finally died.

This treatment can be adopted where lead arsenate is unsafe for reasons discussed below.

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* A. H LEES : "Accessory Wetting Substances with Special Reference to Paraffin Emulsions," *The Annals of Applied Biology*, Vol. III., No. 4, April, 1917.

Gooseberry Sawfly.—The fluid was tried against this larva at Long Ashton with satisfactory results. The effect is to cause all those hit by the fluid to fall to the ground. If thoroughly wetted they die, if only slightly wetted they recover and crawl up the bush again. It is advisable, therefore, not only to spray thoroughly at first, but after each row is finished to give a second spraying to the ground underneath the bushes.

This fluid is not intended to replace lead arsenate entirely in use against this pest, but only to be used when there is danger of poisoning the fruit, that is when the berries are to be picked green.

To test any possible danger of nicotine poisoning, fruit was collected from bushes sprayed with the fluid about a fortnight previously and analysed. Although a good pound of berries was used for the analysis not a trace of nicotine could be found. The reasons for this are probably—

(1) The small amount of nicotine in the fluid.
(2) The volatility of nicotine.
(3) The small amount reaching the berries.
(4) The washing off by rain and dew.

It may, therefore, be used safely against this pest.

Raspberry and Loganberry Beetle (*Byturus tomentosus*).—This pest has long defied treatment. The method usually advised is to shake the canes in the spring, when the beetle appears, over tarred sheets or into pans covered with tree grease. This is useless, since most of them remain in the flowers and tips of the young shoots and can only be dislodged by picking them out. Nevertheless, this treatment, in default of a better, has been adopted in a certain plantation of logans in the Evesham district. With consent of the owners a trial of the nicotine-paraffin emulsion wash was given.

It was found that the fluid did indeed kill the beetles that were thoroughly wetted, but only sufficed to cause those slightly wetted to move elsewhere. Many substances will cause this beetle to appear dead, but in most cases they recover vitality and are no worse for their treatment. It is, therefore, necessary with this insect to keep apparently killed specimens at least a day in order to verify results.

It was clearly necessary, therefore, to perform one spraying to draw the beetles out into the open and to follow with a second to kill them. In order to economise nicotine the first spraying was done with paraffin emulsion only, and this sufficed to penetrate their hiding places and to bring the insects out into the open. This process took about five minutes. The procedure, therefore, adopted was to send one knapsack machine containing paraffin emulsion in advance and to follow after five minutes with a second containing nicotine-paraffin emulsion. This method worked well. Three times, once a week, this double spraying was done and then stopped. as a slight scorching of the leaves took place which caused the foreman in charge to stop the process.

On a visit being made to the plantation it was found that the scorching was negligible and had done no essential harm to the plant.

When a count of berries was made the following result was obtained :—

Control.		*Sprayed.*	
Infested.	*Free.*	*Infested.*	*Free.*
42	0	24	49
100 per cent.	0 per cent.	33 per cent.	67 per cent.

Considering that the plantation was very badly infested, that the spraying was stopped after three times, and that there was, of necessity, a large proportion left unsprayed, giving a large source of re-infection, the results may be considered satisfactory. No damage appeared to be done to the flowers by the fluid, and the set of fruit on the sprayed portions was normal. The damage to the leaves was negligible.

The treatment, of course, is not a cheap one, but the grower is faced with two alternatives. He may either do nothing and sell the very unsightly and infested fruit for jam purposes, in which case he only gets a nominal price, or he may give up loganberry growing and sacrifice his capital spent in plants posts, wire, labour and manure. For good quality and sound fruit, however, suitable for canning, a remunerative price can be obtained, and in the case above described the owners were willing to go to any reasonable expense in order to get such fruit.

At the present time it is impossible to give an estimate of the cost of the fluid, since prices are abnormally high and constantly increasing. Indeed, some of the substances may be unobtainable for spraying purposes.

Nevertheless it has been thought worth while to publish these results in order that anyone in a position to do so may have the opportunity of trying the mixture. It should be pointed out, however, that not any paraffin emulsion is suitable but only that having the formula as above. Those containing less soap do not have sufficient wetting power, and those having more paraffin are liable to burn.

Insecticide and Fungicide.—In addition to the insecticide nicotine the emulsion may be made to carry fungicide as well. Not every fungicide is suitable for inclusion, but only those which contain salts of ammonium, potassium and sodium. Other bases precipitate the soap, causing clogging at the nozzles and destruction of the wetting properties. Liver of sulphur, sodium sulphide ("soluble sulphur") and ammonium sulphide may be used, but *not* lime sulphur, Bordeaux or Burgundy mixtures.

So far only liver of sulphur has been tried, and the results obtained by Professor Barker and the author against American Gooseberry Mildew and published in this *Journal* (March, 1916) were satisfactory.

In this case, being intended only against a fungus, no nicotine was added. There is nothing to prevent the mixture being used with nicotine added, as a combined insecticide and fungicide. Used on fruit trees just before the opening of the flowers it should serve to control aphis, suckers, capsids, winter moth and, possibly, brown rot and scab.

Warning.—It has recently been shown that though nicotine itself is safe to use on fruit that will shortly be eaten, since it is extremely volatile, nicotine sulphate is not. This salt of nicotine is not volatile and therefore remains on the fruit for a considerable time.

If the above spray mixture is used on gooseberries the grower should be sure that he is using nicotine and not nicotine sulphate.

Spring and Summer Spraying of Fruit Trees in Small Plantations for Caterpillars and Aphis (Blight).

Caterpillars.—There is every likelihood of a bad attack of caterpillars on fruit trees this year, and, since there will be a great demand for fruit, it is especially important that growers should keep a sharp look-out for them just as the buds are opening. If the caterpillars are discovered and destroyed then, little real damage will be done to the trees, but if nothing is done a bad attack may develop, resulting in the stripping of the leaves and a severe or total loss of crop.

A Nicotine and Soap Wash is the most satisfactory means of killing the caterpillars before the flowers have opened, as it destroys Apple Sucker and Aphis at the same time. The application should be made by means of a spraying machine or garden syringe, applied in a coarse spray with plenty of force so that the wash penetrates right into the buds and fruit trusses and so poisons the caterpillars' food. To make sufficient solution for 10 medium-sized trees: dissolve ½ lb. of soap, preferably soft, in a little hot water, dilute with cold water to make 10 gal.; add ¾ oz. of nicotine (95 per cent. purity) and stir well. It is best to use soft water, if possible, but when only hard water is available increase the amount of soap to 1 lb.

There are many satisfactory "proprietary" insecticides containing nicotine on the market which may be used instead of this wash.

If the attack is not discovered until after the flowers are open a *solution of lead arsenate* must be substituted, as nicotine will not kill well-grown caterpillars.

The arsenate of lead should be bought in the form of a paste. Half a pound of paste dissolved in 10 gal. of water is sufficient for 10 medium-sized trees. The wash must be applied in a very fine spray so that the entire surface of the leaves is covered with the poison. Spraying should cease when the leaves begin to drip. The amount of arsenate of lead eaten by the caterpillar as it feeds on the leaves is sufficient to cause its death.

Aphis (Blight).—There are many species of Aphides (commonly known as blight or greenfly) which attack fruit trees. In most cases they cause leaf curling and severe injury to the young shoots.

These insects have no biting mouths, but obtain their nourishment by sucking the juices from the internal tissue of the host-plant through a long tongue or proboscis. Consequently poisoning their food is useless, and a spray which will kill them by actual contact must be used.

It is essential to spray as soon as the first signs of attack are noticed—the female Aphides reproduce young with enormous rapidity if circumstances are favourable; but an attack can be reduced very considerably, if not entirely prevented, by killing them before they have commenced breeding.

Moreover, once the leaves are curled it is impossible to kill the Aphides by spraying, as the deformed leaves afford them perfect protection.

The best wash to use is nicotine and soap, as already described, but 20 gal. will be required for 10 trees.

Apply the wash with plenty of force in a coarse spray, using a spraying machine or garden syringe. Make quite sure that all the leaves and shoots are thoroughly wetted.

General Notes.—Thoroughly wash out and clean the spraying machine with cold water after use to prevent clogging.

Great care must be taken in handling either of these washes on account of their poisonous properties. Never eat vegetables which have been grown beneath trees sprayed with lead arsenate or nicotine until at least a month has elapsed since the application in the case of the former, a fortnight in the the case of the latter. The same applies to the picking of green gooseberries from bushes which have been sprayed with arsenate of lead to kill the false caterpillars of the Gooseberry Sawfly.

Lead arsenate and nicotine can only be obtained from firms licensed to sell poisons. If supplies cannot be procured from a horticultural sundriesman, the local chemist should be asked to obtain them. In any case the "Poisons Book" must be signed in compliance with the "Sale of Food and Drugs Act."

The above washes may be used to spray all manner of fruit trees.

NOTE.—*This article is issued also as Food Production Leaflet No. 32.*

Smut in Oats and Barley.

IT is a common experience in many parts of the country to find that the ears of oats and barley, when they emerge from the sheath, are full of a black soot-like powder, though in other respects the plants appear to be healthy. In the course of a week or so the powder is either blown away by the wind or washed out by rain and then only a close inspection shows any indication that the crop has been attacked by smut—or, as it is sometimes described, "blacks" or "sweeps." In barley a second form of smut is often abundant. This is distinguished by the fact that the sooty powder is not set free from the infected ears but remains enclosed by the thin, silvery skin formed by the grain coats. Consequently it is harvested with the crop. During threshing the infected grains are broken, and if much smut is present it may be seen issuing in clouds from the machine. This form of smut is known as "covered smut," whilst the readily dispersable forms previously mentioned are known as the "loose smuts" of oats and barley.

These smuts cause considerable losses yearly, and unfortunately the losses tend to increase owing to the fact that the grain from crops containing infected plants is too often used for seed without any preliminary treatment to make it suitable for the purpose. Where this is the case the proportion of infected plants increases yearly, as the disease is spread by the seed corn. In the case of the "covered smut" of barley, further loss results from the fact that the smut set free during threshing discolours the grain and so reduces its value. This does not apply, however, to either of the other smuts, whose presence in a sample cannot be detected with any certainty even after the most careful examination.

Methods of Infection.—Both the "covered smut" of barley and the "loose smut" of oats are spread by means of the spores (which fotm the soot-like mass of powder in the infected ears) finding their way on to the surface of the grain or even between the coats surrounding it. These lurking spores germinate at about the same time as the grain itself and directly infect the seedling plant. The "loose smut" of barley is spread in a different manner. The spores are set free at the period when the crop is in full flower. As they are scattered broadcast by the wind some of them may settle in the open flowers of the barley, in which case they infect the young embryo within the grain itself. The seedling cannot therefore escape the disease. Unfortunately, too, it is impossible to say whether the disease is present or not, for there appears to be no marked difference between infected and healthy grains.

Treatment.—(I.) *"Covered Smut" of Barley and "Loose Smut" of Oats*.—These smuts, which are propagated by means of lurking spores, can be controlled easily by the use of a steep which will kill the spores without causing injury to the grains. For this purpose the most satisfactory steep is one made of formalin. The blue vitriol or copper sulphate steep, used to prevent the attacks of bunt in wheat, can be used, but it is not so satisfactory, as it is apt to kill a rather large percentage of the grain. All that is necessary to make a formalin steep is to pour 1 pt. of commercial formalin into 20 gal. of water and mix it thoroughly. This strength, corresponding to one part of formalin in 160 of water, should not be exceeded, for a stronger solution is not required for killing the spores and may injure the grain. In fact, if economy with formalin is necessary, a still more dilute solution, made up of 1 pt. to 30 gal., that is one part in 240 of water, will prove effective. The seed grain should be soaked in this solution for ten minutes, stirring it meanwhile in order to be certain that every grain is thoroughly wetted. Then it should be placed in a heap for four hours or so, when it will be ready for drilling. If not required for this purpose immediately it should be dried off in thin layers on a clean barn floor. It is better, however, to sow as soon as possible after dressing. An alternative method is to place the grain in a heap on a floor and pour the dilute solution on it at the rate of 1 gal. for every 4 bush. The heap must be turned repeatedly in order to moisten every grain. Treatment with formalin also frees the grain from the spores of the fungus responsible for "blindness" in barley.

(2.) *"Loose Smut" of Barley.*—This is more difficult to deal with, for the parasite is embedded in the embryo itself. The use of solutions capable of poisoning it is impracticable. It can, however, be destroyed without damaging the embryo by the judicious application of heat, since it is more sensitive to high temperatures than the embryo itself. Unfortunately, the process is more complicated than steeping, and requires to be carried out with considerable care. Nevertheless it is worth the trouble, especially in districts where this form of smut is abundant. The method is as follows: The grain is first soaked in water, preferably lukewarm, for six hours. Its temperature is then raised to 120° F. by putting the grain in a porous receptacle—such as a wicker basket—which can be dipped bodily into water at about this temperature. The basket should be raised and lowered and twisted about from time to time for about five minutes. It must then be plunged into a second vessel of water kept accurately at a temperature of 132° F. It is essential to keep the temperature of the water at this level, for if it is lower the process is not effectual, and if it is higher some of the grain will be damaged. If the temperature is allowed to rise over 135° F. the damage may be serious. It can be kept at the right level by the addition, when necessary, of a further supply of hot water and by the addition of cold water if an excess of hot has been added. The grain requires to be kept at this temperature for ten or twelve minutes. If tipped out on the barn floor the excess of water soon drains away and the grain is ready for sowing, or it may be dried off for subsequent use. If the grain is to be drilled immediately, some allowance must be made for the fact that it swells considerably under this treatment, and consequently the drill if set to deliver the normal rate per acre will actually put on a smaller quantity. As a rough compensation for this it should be set to sow one extra peck of grain for every four pecks sown normally. If, for instance, the ordinary seed rate is 2 bush. (8 pk.) per acre then 2½ bush. or 10 pk. should be aimed at. If it is 3 bush., or 12 pk., then the seed rate for the swollen grain should be 15 pk. per acre.

NOTE.—*This article is issued also as Food Production Leaflet No. 31.*

Notes on Feeding Stuffs in April:

From the Animal Nutrition Institute, Cambridge University.

THERE is no improvement in supplies of feeding stuffs since last month, and buyers find them, if anything, still more difficult to purchase. Market reports show that supplies of all feeding stuffs are small and that many well-known foods are practically unobtainable.

The system of Priority Orders, issued by the Area Livestock Commissioners, by which cowkeepers are entitled to the first claim on stocks of feeding stuffs in the hands of merchants, appears to be working well, and it is most desirable that the system should be extended to other animals.

According to the statement of policy of the Ministry of Food and the Board of Agriculture, which appeared in last month's *Journal*, it has been decided that the small amount of concentrated foods which will be available up to the end of next harvest should be reserved for working horses, milking cows and breeding stock. Unless the system of Priority Orders is immediately extended to these classes of animals, feeding stuffs will be used for other purposes, and there will be a danger of the working horses and milking cows going short.

Assuming that this course of action will be followed, owners of these privileged classes of livestock should write to their Area Livestock Commissioner,* asking for an application form for a Priority Order. On receipt of this form, they should fill in the number of milking cows, working horses, breeding ewes, and breeding sows they possess, and the number of calves and young pigs they propose to wean. On receipt of this information, they will obtain from the Area Livestock Commissioner a Priority Order, which will enable them to purchase feeding stuffs for these animals.

Such a system, although it will not increase the total amount of feeding stuffs available, will at least ensure that the horses, the cows and the breeding stock have first call on what small supplies there are in the country.

Horses.—Farmers must remember that they are not the only horse keepers in the country, and that there are almost as many working horses engaged in transport in the towns, on the railways and in the coalpits, as there are on farms. These latter horses require feeding no less than agricultural horses do, and they are equally indispensable from a national point of view. Farmers should, therefore, exercise the very greatest economy in rationing their horses, so that a proportion of oats and other suitable horse foods may be available for transport horses and pit ponies.

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* A list of the names and addresses of the Area Livestock Commissioners is printed on p.1471 of this issue of the *Journal*.

Although the acreage under oats last year was large, the yield and quality of the crop was disappointing, and unless the very greatest economy is preserved, there will be a grave shortage of horse corn before next year's crop is available.

Every farmer should obtain a copy of the Horses Rationing Order and make it a point of honour to see that his men do not exceed the rations there laid down. Copies of the Order may be obtained from the Director of Horse Transport, 7, Whitehall Gardens, London, S.W. 1.

Milking Cows.—The shortage of feeding stuffs has lately become so acute that many cowkeepers have had difficulty in obtaining concentrated food for their cows, and it does not seem to be generally known that by applying to the Area Livestock Commissioner for his district any cowkeeper can get a Priority Order, which will enable him to purchase food in proportion to the number of cows he possesses.

The most plentiful feeding stuff on the market at the present time is palm nut kernel cake, which is fortunately an excellent milk-producing food. The quantity which can be purchased is strictly rationed, according to the number of cows. Cowkeepers will find that it pays them to ration each individual cow, according to her milk yield, at the rate of 2 lb. of concentrated food per gallon.

Cattle Fattening for Beef Production.—Mr. Prothero has stated that while the present shortage of food continues no concentrated food can be spared for fattening animals, either cattle, sheep or pigs, and if the suggested priority system is adopted, it will be impossible to purchase concentrated food for animals of these classes. Bullocks which have been receiving cake and are now fairly forward in condition will go back if the cake is withheld. Fortunately, under the present conditions of meat shortage, such bullocks will sell readily, and the best policy is to sell them at once and buy in stores to finish off the root crops.

Sheep Fattening for Mutton. The same general policy should be adopted as for bullocks.

Ewes and Lambs.—It is suggested that the Priority Order system should be extended to breeding ewes which lamb before the grass comes. If this suggestion is accepted, owners of breeding ewes will be able to purchase a small allowance of concentrated food for their ewes at lambing time.

Pigs.—If the system of Priority Orders suggested above is put into practice, pig-keepers will be able to buy a fair allowance of meal for their breeding sows and for weaning their young pigs. Their chief difficulty will be to find meals suitable for the purpose. With the present high milling standard, millers' offals are now little better than bran, but they will serve for the purpose if mixed with a quarter of their weight of palm nut kernel meal or coconut cake. The latter is probably the more suitable for the purpose, as it makes a better mash when mixed with water.

The adoption of this Priority Order system should ensure a plentiful supply of strong store pigs for sale to feeders, but it must be generally recognised that it will be impossible to buy meal for fattening. Before the War, 2,000,000 tons of maize and 1,000,000 tons of barley were annually imported into the United Kingdom, chiefly for feeding live stock, and pigs consumed a very large proportion of these materials. These imports have now practically ceased. Further than this, the maintenance of the bread supply has made growing demands on home-grown cereals.

For these reasons, no meal is likely to be available for pig feeding, but it has been repeatedly demonstrated that strong store pigs will thrive entirely without meal or other concentrated food, and there is no doubt that, even under present conditions, large quantities of pigs may be so produced. On the farm roots, skim milk, whey, grass, green stuff and many oddments of different kinds are available. Pigs will thrive on such materials, especially if the outdoor method of feeding is adopted.

Cottagers and *small holders* should combine for co-operative pig feeding on the refuse materials from their houses, gardens and allotments. The same system of co-operative pig keeping is also suitable for towns and cities.

Everyone interested in this subject should read the note on p. 1107 of this *Journal* for January last, by Mr. T. F. Prime, M.R.C.V.S. Further information can be obtained from the Director of Horticulture, Food Production Department, 72, Victoria Street, London, S.W. 1., as regards the keeping of pigs on allotments and in small gardens; from the Director-General, National Salvage Council, Caxton House, London, S.W. 1., as regards the utilisation of waste materials; or from the Director of Pig Production, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. 1, as regards pig breeding on farms.

Notes on Manures in April:

From the Rothamsted Experimental Station, Harpenden, Herts.

Use of Spring Dressings in Frosty Weather.—Cases have recently arisen when injury has followed the application of spring dressings to corn and grass crops when the frost is still on the ground. This was especially observable on grass and seeds mixtures. Experience shows that neither basic slag, superphosphate nor potash salts have this effect, but that sulphate of ammonia does, especially on grass land. On the Rothamsted grass plots great care is taken to avoid applying sulphate of ammonia in time of frost, although no such precautions are necessary for superphosphate and potassium salts—indeed these latter fertilisers are applied in January regardless of whether the weather is cold or mild. This precaution in regard to sulphate of ammonia has been taken ever since the early days of hand sowing, when it was found that in frosty weather the dressings burnt the grass, forming ribbon-like patches wherever it had fallen.

On arable land the danger arises more from the possibility that the young plant may be badly bruised by the horses and the wheels of the manure distributor, than from any actual harm done by the sulphate of ammonia. On heavy land, if the frost happens to break before the end of the application it is impossible to continue the work because the young plant is liable to be pulled out by the wheels of the machine and the hoofs of the horses, owing to the stickiness of the land after a frost.

Last year unsuitable weather intervened while the Broadbalk wheat field at Rothamsted was receiving its sulphate of ammonia, and the distribution had to be suspended for a month ; a succession of frosty nights and moist days kept the land too sticky to allow the distributor to go on working without damage to the plant. The plots which had received their dressings early made a good start, which they maintained for a good time, while those that came later did not do so well at first, although later on they picked up. For many weeks, however, they afforded an admirable demonstration of the need for applying sulphate of ammonia early, and thus avoiding the risk of having the work suspended before it is completed.

Sulphate of Ammonia on Wheat Lacking in Vigour.—Fortunately this year there is not much thin wheat in the country, but where the plant is good but lacking vigour a dressing of sulphate of ammonia may add considerably to the yield by improving the growth.

Low-grade Flue Dusts and Destructor Dusts.—Farmers should remember that many flue dusts and similar substances are of no fertilising value whatever, and no purchase should be made without a satisfactory analysis. There are only two types of material of this class that can profitably be bought :—

(1.) *House hold Soot,* which may contain anything from 2·5 to 11 per cent. of nitrogen (equivalent to 3 to 13 per cent. of ammonia) ; the lower values are given by mixed samples from dwelling houses, and the higher ones from the light, fluffy soot obtainable from sitting-room or kitchen chimneys ; a usual amount may be put at about 4 per cent. As soot is purchased by the bushel it is more useful to know the quantity of nitrogen per bushel ; this is much less variable than the figures for the percentage composition, because the rich soot is very bulky, and the poor soot is more dense. Analyses at Cambridge showed that, as a rule, 1 bush. of soot contains 1 lb. of nitrogen.

Soot from Destructors and Boilers, however, is of very much less value and is very rarely worth purchasing. Such soots or dust commonly contain about 0·5 per cent. of nitrogen, and less than 1 per cent. of potash. On no account should any of these be purchased except on analysis and the recommendation of a disinterested analyst.

Two such samples showed the following percentages :—

	Nitrogen.		*Potash* (K_2O).
1.—	0·5	....	—
2.—	0·47	....	0.80

These have little or no fertilising value.

(2.) *Blast Furnace Flue Dust.*—This is quite a different substance from the foregoing, and owes its value not to nitrogen but to the potash which has been volatilised from the coal, ore and flux by the intense heat of the furnace. Care must be taken in purchasing these to have an analysis made so as to ensure that the material is really what it is supposed to be : several instances have come to light where this was decidedly not the case. In one instance, for example, a dust supposed to contain 5 to 6 per cent. of sulphate of potash contained only 3½ per cent. ; in another case a worthless dust was confused with blast furnace dust, and might have been purchased at considerable loss.

Liming and Ploughing.—As grass land is ploughed up it should, as a rule, be limed, excepting where potatoes and oats are to be sown, and even in these cases liming may be necessary. Much of the poor grass land of the country was badly needing lime while it was still grass, and conversion into arable land only emphasises the need and makes it even greater. The expert farmer can judge by the character of the grass how great is the need for lime; in the worst cases the vegetation has formed a peaty mass which peels off in front of the plough and is only buried with difficulty. Good instances are seen in Yorkshire, and they are very common elsewhere. Once this peaty vegetation is got well into the soil ***and treated with lime*** it begins to decompose, yielding valuable plant food and supplying that much-needed element of plant nutrition—nitrogen. It is a sure indication that ploughed-up grass land needs lime when the vegetation included much sorrel, deep green patches of sheep's fescue or tussocks of *Aira cæspitosa*—a very coarse grass with leaves that cut like files.

One ton of quicklime is about as effective as 2 tons of ground limestone. and it may therefore prove more economical because of the saving in transport and handling. Where the land is extremely sour it may prove most economical to use lime rather than limestone, but in general there is little to choose between them when compared in the quantities just given. On the other hand. grass land rich in clover is usually less in need of lime.

A considerable number of wastes from manufacturing processes contain lime or calcium carbonate and may prove of great value. They should, however, only be purchased on analysis. Some of them are very poor, containing only 15 or 20 per cent. of calcium carbonate, and, in addition, they are wet and sludge-like and could only be applied with great difficulty and expense. The water-softening processes used in chalky districts give a very nice material which would prove of great value in gardens and allotments.

Fertilisers for Farm Crops in 1918.

THE conditions throughout the world are such that unless the nation produces as much food as possible at home it will be faced with a serious shortage and a possible scarcity. There has never been a time in the history of this country when food has been wanted so much as it will be wanted this year. To cope with this situation will require the combined efforts of all connected with the land and the full use of every resource which can be placed at their disposal.

There is no greater aid to high production than artificial manures, skilfully applied.

Examples of how the chief fertilisers available may be used are given below. The quantities suggested in each case are *per acre.* If superphosphate cannot be obtained, slag or other sources of phosphate may be substituted, care being taken not to mix sulphate of ammonia with slag or other manures containing free lime, *e.g.*, mineral phosphate, before application.

The prices of sulphate of ammonia, superphosphate, basic slag, compound manures, and blast furnace flue dust have been fixed either by Order or by agreement with the makers, and particulars may be obtained on application to the Food Production Department, 72, Victoria Street, London, S.W. 1.

CEREALS.

Winter Wheat—

1. (*a*) *where land has been dunged.* (*b*) *after a well-dunged root crop.* (*c*) *after a good stand of clover.* (*d*) *after rich old pasture.* (*e*) *after beans or bare fallow.*	No artificials need be applied.
2. (*a*) *where soil is impoverished.* (*b*) *after a straw crop.*	¾ to 1½ cwt. of sulphate of ammonia, 2 cwt. superphosphate.

If part of this has been applied in autumn the rest should be applied before harrowing the wheat in spring.

3. (*a*) *a thin plant.* (*b*) *a weak plant after a wet winter.*	1 cwt. of sulphate of ammonia and 2 cwt. of superphosphate in early spring.

Spring Wheat—

Where the condition of the land makes manuring necessary, or where the crop is sown late, ¾ to 1 cwt. of sulphate of ammonia with 2 to 3 cwt. of superphosphate may be harrowed in with seed. This dressing will encourage growth, hasten maturity and increase the yield.

Barley—

1. (*a*) *After roots well manured.* (*b*) *After roots folded with sheep.*	No artificials need be applied.

If, however, the barley usually lodges badly when grown in this way, a dressing of 2½ cwt. superphosphate may be given.

2. *(a) Impoverished soil.*
(b) After a straw crop.
¾ to 1 cwt. of sulphate of ammonia with 2 cwt. of superphosphate harrowed in with seed.

Oats—

1. *Rich Soil.* No artificials need be applied.
2. *Other soils, where manuring appears necessary, and there is no danger of the crop being laid.* 1 cwt. of sulphate of ammonia with 2 cwt. of superphosphate harrowed in with seed.

This mixture is specially suited to oats in wet and late districts: it will hasten maturity and stiffen the straw. In districts subject to frit fly ("bottling") it will help to safeguard the crop from attack. It will also tend to keep down weeds.

Maize for Fodder—

10 tons dung in winter or early spring.
1–2 cwt. sulphate of ammonia with 2–3 cwt. superphosphate at seed time.

GREEN AND ROOT CROPS.

Mangolds—

1. *With* 10 *to* 18 *tons of dung—*
1½–2 cwt. of sulphate of ammonia.
2½ cwt. of superphosphate.
3–5 cwt. of salt .. .. Applied a week or two before the seed is sown.

2. *Without dung—*
2–3 cwt. of sulphate of ammonia.
5 cwt. of superphosphate.*
4 cwt. of salt .. ..
8 cwt. of blast furnace flue dust.†
Applied a week or two before the seed is sown.

Part of the sulphate of ammonia should be applied as a top dressing after the crop has been singled.

If blast furnace flue dust is not obtainable, the dressing of salt might be increased to 6 or 8 cwt.

Turnips, Swedes and Kohl Rabi—

1. *With* 10 *to* 12 *tons of dung—*
3 cwt. of superphosphate, *or*
4 cwt basic slag.

If crops of 18 tons and over per acre are usually obtained, 1 cwt. sulphate of ammonia may also be given.

2. *Without dung—*
1 cwt. of sulphate of ammonia,
5 cwt. of superphosphate, *or*
7 cwt. of basic slag.

If the land be light, 3 cwt. of salt in addition to the above manures may be used with advantage, and should be distributed a week or two before seed time.

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* 5 to 6 cwt. of basic slag applied broadcast in February or early March may be used instead of superphosphate.

† *See* Food Production Leaflet No. 23, *Blast Furnace Flue Dust as a Potash Manure.*

Rape, Thousand Headed Kale, and Mustard—

As these crops are generally consumed where they grow, the land need not get farmyard manure. They should get rather more nitrogen and less phosphate than the last-mentioned crops.

Cabbages—

10 to 18 tons of dung,
3 to 4 cwt. of superphosphate,
2 to 3 cwt. of salt (on light land).

When the plants are fairly established 1 to 2 cwt. of sulphate of ammonia should be applied in " pinches " round the base of each plant and worked into the soil.

Potatoes—

1. *With 10 to 15 tons of dung, or after rich grass*—
   1 cwt. of sulphate of ammonia,
   3 cwt. of superphosphate,
   5 cwt. blast furnace flue dust (high-grade).
2. *Without dung, or after grass of moderate quality*—
   1½–2 cwt. of sulphate of ammonia,
   4–5 cwt. of superphosphate,
   10 cwt. of blast furnace flue dust (high-grade).

In the case of early potatoes a little more sulphate of ammonia may usually be given with advantage.

Carrots and Parsnips—

1. *Land in good condition*—
   1 cwt. of sulphate of ammonia,
   4 cwt. of superphosphate,
   5 cwt. blast furnace flue dust.
2. *Land in poor condition*—
   10 tons of dung per acre in autumn or winter,
   1½ cwt of sulphate of ammonia,
   4 cwt. of superphosphate,
   5 cwt. of blast furnace flue dust.

Part of the sulphate of ammonia may be replaced by soot at the rate of 5 to 10 cwt. (Six cwt. of soot contain about as much nitrogen as 1 cwt. of sulphate of ammonia.)

LEGUMINOUS CROPS.

Beans and Vetches—

10 tons of dung (if available).
4 cwt. of superphosphate or basic slag.

Peas—

4 to 5 cwt. of superphosphate or basic slag.

Sainfoin, Lucerne, Red Clover—

About 4 to 5 cwt of basic slag, applied in winter or early spring, and 3 to 4 cwt. of superphosphate later in the year if thought desirable.

HAY AND PASTURE.

Seeds Hay—

1. *Where clover is absent or scarce*—
   1 to 1½ cwt. of sulphate of ammonia,
   2 cwt. of basic slag or superphosphate,
   or about 2,000 gal. of liquid manure per acre. } Early in spring.

2. *Where clover is abundant*—
   3 or 4 cwt. of basic slag or superphosphate.
3. *Where clover is a fair "take"*—
   ½ to ¾ cwt. of sulphate of ammonia,
   2 cwt. of basic slag or superphosphate.

Meadow Hay—

1. 10 to 12 tons of dung every 4 years, with 1 cwt. of sulphate of ammonia and 3 or 4 cwt. of basic slag applied in autumn, or superphosphate applied in spring in the intervening years.
2. *Where no dung is available*—
   1½ cwt. of sulphate of ammonia,
   2–3 cwt. of superphosphate.

If the land is found to respond to basic slag it should get about 10 cwt. in autumn or winter, and need get nothing more till the clover begins to fail. Attention should then be given to forcing grass as distinguished from clover, by using annually about 1 cwt. of sulphate of ammonia. After two or three years of such treatment the land will again be in a condition to grow clover, when 5 to 7 cwt. of basic slag and 1 cwt. of sulphate of potash, when available, should be given, followed in subsequent years by nitrogenous manures as before.

If the land does not respond to slag a general mixture of artificials should be given every year.

Pastures.—Many pastures suffer from defective drainage. In suitable cases this can be speedily and cheaply remedied by means of the mole-plough.

Where the land is of a character that responds to basic slag, such as that on the Boulder clay, 8 to 10 cwt. of this fertiliser should be applied every six or eight years. If the land has a thick turf, and is consequently unsuited to the rapid spread of white clover, a dressing of 2 to 3 tons of lime per acre should be given, to be followed by moderate dressings of superphosphate with the use of cake during the latter part of each season. Coarse herbage should be mown off where necessary and the aftergrowth subsequently kept well grazed. This will gradually lead to the elimination of the matted turf, and the growth of finer herbage. Where the turf is so dense as to prevent the access of rain to the soil, it should be thoroughly harrowed during the winter months before liming.

NOTE.—*This article is also issued as Food Production Leaflet No. 33.*

Preliminary Volume Tables for Larch.

THE volume tables below are based on measurements of larch trees felled in connection with the statistics which the Board are collecting as to the rate of growth of timber under different conditions.

For constructing the tables, measurements of 690 individual larch have been used. For each tree the following dimensions were determined: Total length to the nearest 6 in., length to 9½ in. true girth over bark (3 in. diameter), quarter girth at breast height (4 ft. 3 in. above the ground) to the nearest eighth of an inch, quarter girth under bark at mid-timber height to the nearest eighth of an inch.

Method of Constructing the Tables.—The trees were first grouped according to total length into 10-ft. height classes. The number of stems falling into each class were :—

30 ft.—39½ ft.,	75 stems.	70 ft.—79½ ft.,	67 stems.
40 ,, —49½	177 ,,	80 ,, —89½ ,,	43
50 ,, —59½ ,,	184 ,,	90 ,, —99½ ,,	20 ,,
60 ,, —69½ ,,	124 ,,		

Total .. .. .. 690 stems.

For each height class the quarter girth of the individual stems was plotted against the volume quarter girth (under bark). Curves were then drawn in representing the mean relation between quarter girth and volume for the several height classes, and the volumes were read off from these curves and entered in the volume table (Table I., p. 1431) against the various quarter girths.

The curves for all the height classes are shown in the appended diagram (p. 1432).

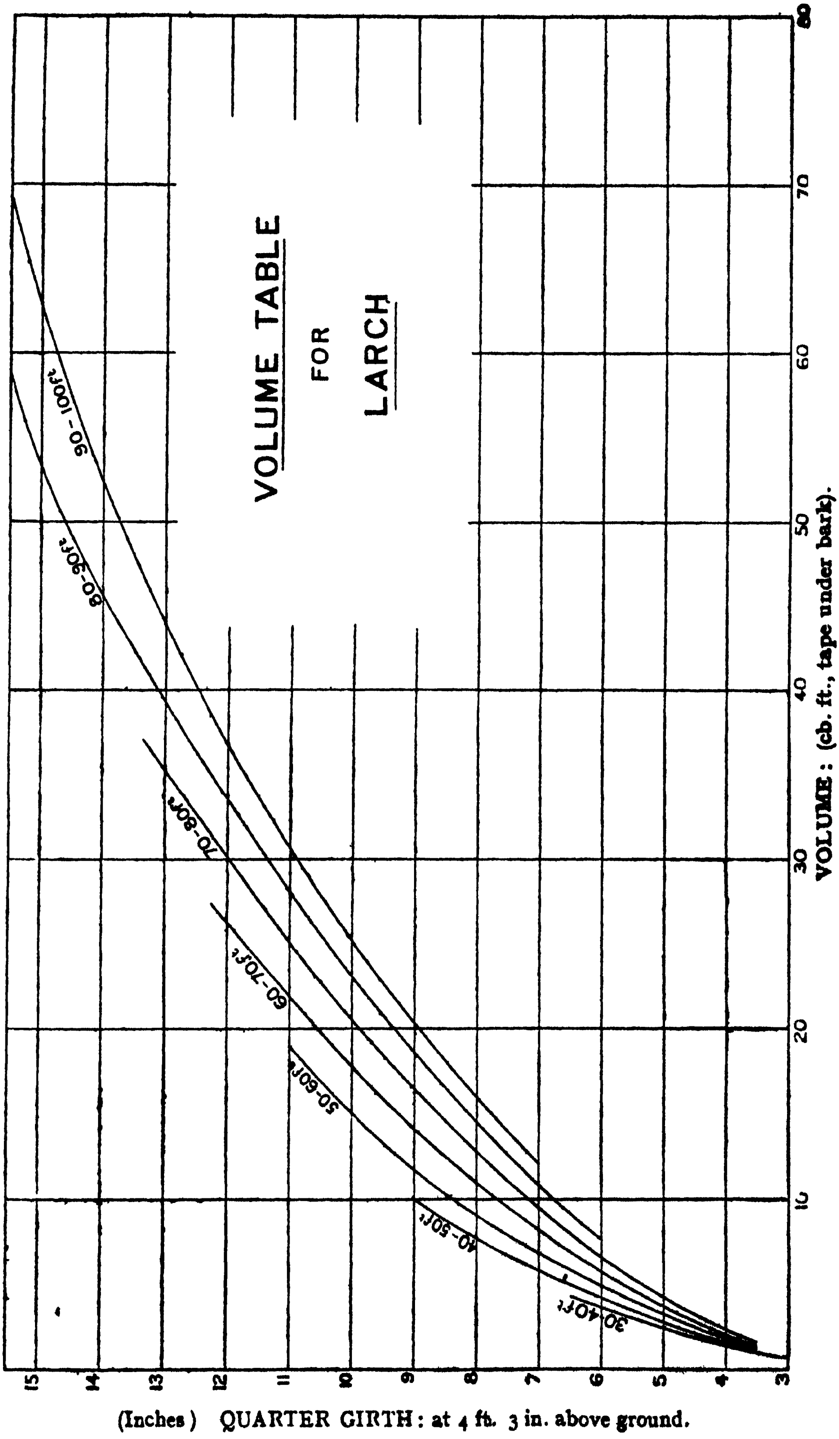
Method of Using the Table.—The table will be found useful for the rapid determination of the volume of standing larch woods. The first step is to girth all the trees with an ordinary girthing tape to the nearest quarter inch. The number of trees with their quarter girths should be entered in the timber book thus :—

Quarter Girth.					Total.
3¾	III	..	..	..	3
4	++++	I	..	..	6
4¼	++++	++++	..	..	10
4½	++++	++++	..	..	10

The next step is to determine the total height of the trees. In order to obtain fairly approximate results it will be sufficient in large woods of fairly even height to determine the mean height of the wood by measuring the height of several average

TABLE I—*Volume Table for Larch.*

Quarter Girth at Breast Height	Total Height in Feet						
	30–40	40–50	50–60	60–70	70–80	80–90	90–100
	Volume per Tree (cb ft, tape under bark)						
2	08	—	—	—	—	—	—
¼	19	—	—	—	—	—	—
½	32	34	—	—	—	—	—
¾	46	51	—	—	—	—	—
3	64	66	74	—	—	—	—
¼	81	88	98	—	—	—	—
½	1 00	1 10	1 20	—	—	—	—
¾	1 20	1 32	1 50	—	—	—	—
4	1 40	1 58	1 80	2 10	—	—	—
¼	1 64	1 86	2 15	2 48	—	—	—
½	1 88	2 15	2 50	2 85	—	—	—
¾	2 12	2 46	2 88	3 28	—	—	—
5	2 40	2 78	3 25	3 70	4 22	—	—
¼	2 68	3 10	3 65	4 20	4 80	—	—
½	3 00	3 45	4 08	4 70	5 38	—	—
¾	3 30	4 00	4 50	5 25	5 98	—	—
6	3 66	4 20	4 90	5 80	6 60	7 60	—
¼	4 00	4 60	5 40	6 40	7 40	8 40	—
½	4 20	4 90	5 90	7 00	8 00	9 20	—
¾	—	5 40	6 30	7 50	8 70	10 00	11 20
7	—	5 80	6 80	8 20	9 60	10 80	12 20
¼	—	6 20	7 40	8 90	10 40	11 80	13 00
½	—	6 70	7 90	9 60	11 30	12 60	14 00
¾	—	7 20	8 50	10 30	12 00	13 50	15 00
8	—	7 70	9 10	11 00	13 00	14 50	16 00
¼	—	8 20	9 70	11 80	13 80	15 50	17 00
½	—	8 80	10 30	12 50	14 60	16 60	18 10
¾	—	9 40	11 00	13 30	15 60	17 60	19 20
9	—	10 00	11 80	14 10	16 50	18 60	20 40
¼	—	—	12 60	15 00	17 40	19 70	21 50
½	—	—	13 30	15 90	18 50	20 80	22 70
¾	—	—	14 20	16 90	19 50	21 90	24 00
10	—	—	15 10	17 80	20 50	23 00	25 20
¼	—	—	16 00	18 80	21 60	24 30	26 50
½	—	—	16 90	19 90	22 80	25 50	27 80
¾	—	—	—	21 00	24 00	26 80	29 40
11	—	—	—	22 00	25 10	28 10	30 80
¼	—	—	—	23 00	26 40	29 40	32 20
½	—	—	—	24 10	27 60	30 80	33 70
¾	—	—	—	25 20	28 80	32 10	35 20
12	—	—	—	26 20	30 00	33 50	36 80
¼	—	—	—	27 40	31 20	34 90	38 40
½	—	—	—	—	32 60	36 30	40 20
¾	—	—	—	—	33 90	37 80	42 10
13	—	—	—	—	35 20	39 20	44 00
¼	—	—	—	—	36 60.	40 80	46 00
½	—	—	—	—	—	42 30	48 10
¾	—	—	—	—	—	44 00	50 20
14	—	—	—	—	—	45 60	52 40
¼	—	—	—	—	—	47 30	54 80
½	—	—	—	—	—	49 10	57 40
¾	—	—	—	—	—	51 10	60 00
15	—	—	—	—	—	53 3	63 00
¼	—	—	—	—	—	55 8	66 00
½	—	—	—	—	—	58 5	69 20


VOLUME TABLE
FOR
LARCH
90-100ft
80-90ft
70-80ft
60-70ft
50-60ft
40-50ft
30-40ft
10
20
30
40
50
60
70
80
VOLUME: (cb. ft., tape under bark).
3
4
5
6
7
8
9
10
11
12
13
14
15
(Inches) QUARTER GIRTH: at 4 ft. 3 in. above ground.

stems and taking the mean of these measurements. Height measurements may be made either :—

(*a*) By felling and measuring the sample trees with a tape :
(*b*) With a hypsometer standing :
(*c*) By ocular estimate with or without a measuring pole standing.

The height should be taken to the top of the leading shoot.

The mean height measurement obtained will indicate to which height class the wood belongs.

More accurate results may be obtained where the height of the trees shows a wide range by dividing the trees into two or more height classes and grouping them accordingly, thus :—

Quarter Girth.		*Mean Height.*		*Height Class.*
5 in. and under	..	47 ft.	..	40—50
Over 5 in.	..	54 ,,	..	50—60

Having determined the mean height, the calculation of the volume of the wood reduces itself merely to a question of summing the volumes of individual trees as read off from the table under the respective height classes. The table below illustrates this procedure :—

TABLE II.

Height Class.	Quarter Girth.	No of Trees.	Volume per Tree from Table.	Total Volume ((3) × (4))
(1)	(2)	(3)	(4) cub ft.	(5) cub. ft.
80–90	7	1	10.8	10.8
	¼	—	—	—
	½	4	12.6	50.4
	¾	—	—	—
	8	1	14.5	14.5
	¼	3	15.5	46.5
	½	2	16 6	33 2
	¾	2	17.6	35.2
	9	3	18 6	55 8
	¼	5	19.7	98.5
	½	4	20.8	83.2
	¾	3	21.9	65.7
	10	5	23.0	115.0
	¼	2	24.3	48 6
	½	1	25 5	25.5
	¾	2	29.4	58.8
90–100	11	3	30.8	92.4
	¼	5	32.2	161.0
	½	2	33.7	67.4
	¾	2	35.2	70.4
	12	3	36.8	110.4
	¼	3	38.4	115.2
	½	—	—	—
	¾	3	42.1	126.3
	13	1	44.0	44.0
	¼	2	46.0	92.0
	Totals..	62	—	1720.8

The volume obtained is the total volume (tape under bark) of timber down to 3 in. diameter.

A simpler but less accurate method of determining the total volume is to determine the average height and average quarter girth at breast height of all the trees, take out the corresponding cubic contents from the volume table and multiply by the total number of trees.

Accuracy of the Tables.—The tables cannot be expected to give accurate results when used for individual trees, but only when applied to numbers sufficient to allow the individual peculiarities of trees to balance up. The results below show the degree of accuracy obtained by applying the tables to plots of trees which had also been measured by the most accurate methods applicable to standing timber.

TABLE III.

No of Plot	Mean Height	No of Stems	Vol as Calculated by Table	Vol as Measured in Field	Error by Volume Table Determination	
			Treated as One Height Class			
	ft		cub ft	cub ft	cub ft	per cent
120	54	151	696·2	741·0	− 44·8	− 6·1
122	59	138	921·6	1077·3	−155·7	−14·5
129	51	140	545·8	557·9	− 12·1	− 2·2
128	69	93	866·6	953·0	− 86·4	− 9·1
131	49	156	525·5	565·3	− 39·8	− 7·0
134	89	62	1533·0	1623·0	− 90·0	− 5·5
136	67	48	605·6	622·4	− 16·8	− 2·7
148	39	133	209·9	243·3	− 33·4	−13·7
142	55	100	737·7	774·2	− 36·5	− 4·7
		Mean for 9 plots	..	..	..	− 7·7
			Treated as Two Height Classes			
120	54	151	705·4	741·0	− 35·6	− 4·8
122	59	138	986·0	1077·3	− 91·3	− 8·5
129	51	140	545·8	557·9	− 12·1	− 2·2
128	69	93	909·5	953·0	− 43·5	− 4·6
131	49	156	570·8	565·3	+ 5·5	+ 1·0
134	89	62	1720·8	1623·0	+ 97·8	+ 5·1
136	67	48	652·8	625·4	+ 27·4	+ 4·2
148	39	133	228·7	243·3	− 14·6	− 5·1
142	55	100	760·2	774·2	− 14·0	− 1·8
		Mean for 9 plots	..	..	..	— 1·6

Bark Allowances.—It appears from the under-bark and over-bark measurements of the trees used for the above tables that the deduction from the cubic contents which must be made on account of bark varies from 15 per cent. to 25 per cent. of the volume, averaging slightly over 20 per cent. Since the volumes given in these tables are under-bark measurements, it follows that they must be increased by one quarter if over-bark volumes are required.

It is proposed to amplify and, if necessary, to revise the tables as more data become available, but, meanwhile, copies printed on cardboard will shortly be obtainable on application to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. 1.

War-time Allotments.

1. UNDER Regulation 2L of the Defence of the Realm Regulations the Board have power, where they are of opinion that it is expedient to exercise it with the view of maintaining the food supply of the country, to enter on any land and cultivate it or arrange for its cultivation; and further they may authorise any local authority to exercise on behalf of the Board any of the powers conferred on the Board by the Regulation.

2. In accordance with the Regulation the Board made on 8th December, 1916, an Order, entitled The Cultivation of Lands Order, 1916, on the 20th February, 1917, an Order, entitled The Cultivation of Lands Order, 1917 (No. 2), and on the 25th April, 1917, an Order entitled The Cultivation of Lands Order, 1917 (No. 4), whereby the London County Council, and the Council of each Municipal Borough or Urban District of England and Wales were authorised to exercise the powers summarised in the following paragraphs.

3. **Entry on Land.**—A Council may enter on any land which, in the opinion of the Council, can conveniently be cultivated by persons residing in the district of the Council, and whether the land is or is not situate within the district, subject to certain restrictions, namely, (1) A Council may not enter on any garden or pleasure ground occupied or usually occupied together with a dwelling-house; (2) A Council may not enter on any common land (which expression includes any land subject to be enclosed under the Inclosure Acts, 1845 to 1882, and any town or village green and any other land subject to any right of common) except with the express consent of the Board; (3) A Council may not enter on occupied land which is not within the County of London or a county borough except with the written consent of the occupier or, alternatively, with the sanction of the County Agricultural Executive Committee.

4. As soon as possible after entry, the Council must give notice of their entry to the owner of the land if he is not the occupier of it.

5. A Council should not enter on any land which is essential for dairy purposes, nor on meadow or pasture land of good quality the breaking up of which would involve on the termination of the Council's occupation an expenditure disproportionate to the value of the crops that could be grown on the land.

6. **Letting.**—A Council may let land on which they have entered to one or more cultivators, or they may arrange with a Vacant Land Society for its cultivation, and delegate to the Society such of their powers as may be necessary for the purpose of the land being let by the Society. As a rule an area of 10 rods, about 300 sq. yd., is as much land as one man can fully cultivate in his spare time; but there is no reason why a larger area should not be let to one man if he is able to cultivate it and sufficient land is available.

7. There is no objection, if the Council see fit, to the keeping of poultry, rabbits, etc., in combination with the cultivation of a plot. A plot, however, must not be used for grazing, or for vegetable crops which continue to be productive for more than one year.

8. **Finance.**—If possible, the compensation in the nature of rent to be paid for occupied land should be arranged with the occupier, not necessarily before the Council enter, but such compensation must not exceed the rent paid by the occupier himself; or, if the land is occupied by the owner, must not exceed the annual value of the land for the purpose of income tax together with any tithe rent-charge to which the land is subject.

9. *Rent Payable by Cultivators.*—A Council should arrange so far as possible that the cost of providing and adapting land for cultivation should be recouped by the rents charged to the cultivators.

10. *Expenses.*—If the receipts of a Council are insufficient to meet the expenses incurred in providing plots, owing to the fact that substantial expenditure had to be incurred on fencing or other works of adaptation, the Board will pay the deficiency up to an amount not exceeding £2 for each acre provided by the Council. Where, however, the Board are satisfied that excess expenditure was reasonably incurred in consequence of which the deficiency between payments and receipts has unavoidably been increased beyond £2 an acre,

but not exceeding £4 an acre, the Board will make a further payment of one-half of the increased deficiency, and the Local Government Board will sanction the payment out of the rates of the other half. Within these limits Councils are authorised to incur expense in carrying out their powers. Separate accounts must be kept of all receipts and expenditure under the Cultivation of Lands Order, and they must be open to inspection at any time by an officer of the Board.

11. *Compensation.*—The Board are liable to pay compensation to any person injuriously affected by the entry on land and the exercise of powers under Regulation 2L. Unless the amount of the compensation is agreed it is to be fixed by a single arbitrator in accordance with the provisions of the Second Schedule to the Agricultural Holdings Act, 1908.

12. The Board have discretionary power to pay compensation in full or on account before the termination of their occupation of land. Claims should be made in the first instance to the Council concerned, who should forward the statement, with their observations thereon, to the Board.

13. The Board will, subject to any arrangement on this subject made with the plot holder, pay compensation to him if through no fault of his own a Council, or the Board, give him notice to quit taking effect before the 1st January, 1919; in no case will the compensation exceed the value of the crops on the land at the time of quitting and of the labour and manure applied since the taking of the last crop in anticipation of a future crop.

14. **Tenure.**—Land taken under the Orders must be given up at any time on the Board being satisfied that the land is required by the owner for immediate use for building or other exceptional purposes. Otherwise, as at present arranged, the cultivator may expect to retain his plot at least until the 1st January, 1919, and if he is required, through no fault of his own, to quit before that date he will obtain the compensation referred to in paragraph 13. It is hoped that in many cases it will be possible to arrange for the retention of the land beyond 1st January, 1919.

15. **Fencing and Trespass.**—As a general rule it is not intended that a Council should incur the expense of fencing the plots, but they are authorised to erect any essential fencing, within the limits of expenditure stated in paragraph 10. Cultivators themselves should protect their plots from trespass or pilfering, and a notice under the provisions of Regulation 2N of the

Defence of the Realm Regulations in the following terms should be displayed :—

> " Possession of this land has been taken under Regulation 2N of the Defence of the Realm Regulations for allotments or field gardens.
>
> " Any person who without lawful authority enters or remains on this land, or damages any growing crops or hedge or fence thereon, is liable on conviction under the Defence of the Realm Regulations to a fine of £100 or imprisonment."

16. **Land Owned or Occupied by a Council.**—A Council may arrange for the cultivation of land in their own possession, and retain any rents or profits arising from the use of the land, provided that no financial claim is made on the Board.

17. **Other Local Authorities.**—A number of the Metropolitan Borough Councils, and of Rural District and Parish Councils in semi-urban and industrial areas, have been specially authorised by the Board to exercise these powers of providing allotments.

18. **Rural Areas.**—The County Agricultural Executive Committees have power under Regulation 2M of the Defence of the Realm Regulations to enter on land and arrange with a parish council, or a society or person, for its cultivation in allotments, and as a rule it is convenient that a parish council should apply to the Committee for the county when they are unable to acquire land by agreement with the owner or occupier.

19. **Application for Plots.**—Any person who desires a plot for cultivation should apply to the Council of the district in which he resides.

NOTE.—*This article is also issued as Food Production Leaflet No. 36.*

Notes on Allotments.

The Allotment Movement.—During the third week of February land for over 7,000 new allotments was acquired or arranged for by 25 local authorities acting on the advice of the Food Production Department, the acreage concerned being 499¾ acres. The average increase in the number of new allotments for the four preceding weeks laid out under the Cultivation of Lands Order by local authorities was at the rate of about 10,000 plots weekly. These figures, however, take no account of the large number of new allotments provided by private arrangement.

Sir Arthur Lee, in a recent Circular,* expresses his satisfaction at the "notable addition" which the energetic administration by local authorities of the Cultivation of Land Order has secured to the national food supply in response to his appeals during the last year.

Allotments from Grass.—An impression seems to exist in certain quarters that it is already a little late to break up grass land for allotments if they are to be successfully cropped this year. Whilst it is perfectly true that, where possible, land for spring cropping should be broken up in autumn or winter, there is no reason to doubt the possibility of growing excellent crops this season on land broken up now. In fact last year satisfactory results were obtained in many cases from grass land that was dug for the first time as late as the end of April or early May, according to statements made by the Food Production Department's experts. The Department, by the way, has now representatives with special knowledge alike of allotment organisation and allotment cultivation available for the advice of would-be allotment holders or local authorities desirious of laying out allotment schemes. These experts on application are sent promptly to any district and will give an opinion on the choice of land, the best crops to grow, the most up-to-date methods of cultivation, and so on. As a direct result of the activities of these representatives about 10,000 new allotments are being laid out weekly by local authorities and probably as many more by individual owners of land, notably by large employers of labour with ground vacant near their works. If every man and woman with a few hours weekly to spare for tending an allotment will write to the Clerk of the Local Council and ask for land if land cannot be otherwise obtained; and failing a prompt response will communicate with the Food Production Department, it is probable that at least double as many new allotments could be laid out every week for the next month or two. In most districts there is still land available that would cut up well for allotment purposes. Where there is no such land arrangements can often be made for the better cultivation of back yards and under-cultivated or uncultivated kitchen gardens.

Asked recently as to the best time for starting an allotment, a Food Production Department expert said: "There is no time like the present time."

School Children as Gardeners.—Apart from the school gardens, which are increasing in number, size and excellence every year, a great deal of work in the direction of food production is being done by children either in the gardens attached to their homes or elsewhere. In a number of towns the children have been organised for the cultivation of the back gardens. According to a report sent to the Food Production Department, Leyton, Essex, has an excellent record in this matter; and it is claimed locally that no other town can equal this record. Apparently the school children of Leyton last year attended to 4,883 back gardens, 2,000 little girls assisting in the work.

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* See this *Journal*, p. 1460.

How to Dig.—The Royal Horticultural Society, of Vincent Square, Westminster, London, S.W. 1., has done splendid service for the cause of food production during the past year in alliance with the Food Production Department. The latest departure of this Society is characteristically practical and should prove very popular, especially with new gardening and allotment societies. The Society has had prepared a series of three dozen slides showing in detail the various operations involved in properly digging and trenching allotment ground. The slides will be lent free of cost to *bonâ fide* allotment and food production associations applying for them at the above address. Pictorial lectures invariably attract good audiences and the secretaries of societies desiring the loan of these slides should make early application.

Dwarf Beans.—Dwarf beans are among the most useful of substitutes for meat, and they can be dried easily and stored conveniently. Allotment men should grow them freely. There have been rumours of a seed shortage. However, allotment associations and other similar bodies are informed that the Food Production Department has made arrangements* whereby supplies of Canadian Wonder Beans are now available through the ordinary trade channels. If any association is unable to obtain supplies from the retail seedsman or merchant with whom it usually deals, the secretary should communicate with the Food Production Department (Seeds Section), 72, Victoria Street, S.W. 1, stating the name of the firm. The latter will then be informed where wholesale supplies may be purchased.

Seedlings for Cottagers.—Some time ago the Food Production Department suggested to the owners of large gardens, and especially those of them with a fair amount of glass-frames and greenhouses, that they might do important national service by supplying their neighbours with seedling plants.

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* See this *Journal*, p. 1470.

It is interesting to learn that this advice has been widely followed in many parts of the country, and that a considerable area of glass is being handled this spring on the lines laid down. A specific instance was reported to the Department in February. Mr. William Heycock Rippin, of Kirby Muxloe, Leicestershire, writes that he has not only planted an extra acre of his own land with potatoes to be used as pig-food, but has recommended this course to others in his district. He goes on to state :—" In this village I have arranged with owners of greenhouses to raise onion plants which when ready for transplanting in the garden are to be supplied to cottagers at 50 for *2d.* I have also arranged with a number of gardeners to raise many varieties of cabbage plants to be supplied to cottagers at *1d.* per score.

In this way, says Mr. Rippin, who is the horticulture representative for the Blaby Rural District Council, " I think there will be an economy in the use of seed and people will be encouraged to grow more food for their own use." It is an admirable example of what can be done quite conveniently and advantageously in most villages ; and the Department hopes that wherever a scheme has not yet been set up, and the necessity seems to exist, a move will be made promptly in the matter.

Munition Workers' Allotments.—By arrangement with the Food Production Department, the Ministry of Munitions has undertaken to communicate with all munition factories and to recommend that steps shall be taken by the managements to secure land for cultivation by the munition workers. The produce of the allotments, it is proposed, shall be dealt with in the munition canteens.

Couch-grass for Feeding Purposes.

COUCH-GRASS (*Agropyrum repens*, Beauv.) is perhaps the worst perennial weed of arable land, and has been responsible for so much loss and trouble to farmers that they would probably be gratified to discover that they could make some use of it. The rhizomes, or creeping root-stocks of couch-grass, have been very widely used in the past for medicinal purposes, more particularly in the United States and on the Continent. In order to prepare them for market the root stocks are washed, dried, deprived as far as possible of their hair-like roots, and chopped into lengths of about 1 in. by means of a chaff-cutter.

We are here concerned, however, with the possible use of the root-stocks of couch-grass for feeding purposes, not only for the larger livestock, but for poultry. In this connection it may first be stated that they have been eaten by human beings in time of scarcity and have even been used in the manufacture of a rough kind of bread. They are considered juicy, sweet and nourishing, and in Italy have been, and possibly still are, collected, washed and sold as a food for horses. When boiled they have been regarded by some as an excellent food for pigs, and the fresh material has also been fed to sheep.

Johnson and Sowerby* state that the roots of couch-grass are used on the Continent as food for cattle and horses, that in Italy they are carefully gathered by the peasants and sold in the markets, and that they contain a large quantity of starch and sugar, with some mucilage, and might doubtless be used as human food.

Withering (1776) actually says that they have been dried and ground to meal to make bread in years of scarcity.

P. Sowerby† says that the creeping stems of this grass are succulent, sweet and very nutritive, and that they are greedily devoured by horses and cows.

Pott‡ states that the rhizomes are collected, cleaned, cut up, dried, pulverised in mortars or ground up and made into bread with an equal admixture of cereal meal. He also says that they can be fed to sheep or horses, forming indeed an excellent food for the latter. In Normandy horses are sometimes given proportional amounts of the rhizomes in place of oats. The rhizomes are considered to exercise stimulating effects similar to those produced by oats, although their content of protein and oil is much lower.

At Chedzoy, in Somerset, a field full of couch was cleared by ploughing and working out. The couch was made into a rick as high as could be pitched, the intention being to use it as bottoms for other ricks later. Cattle were in the field and helped themselves to the couch until they ultimately demolished the whole rick. They relished the couch and evidently throve upon it.

Wilson§ writes as follows :—" In Rome and Naples they (roots of couch-grass) are extensively used, either in a simply-washed condition or in a state of mixture with carrots as food for horses ; and in Britain they might be given raw to pigs, steamed or boiled to horses and cattle, and washed, macerated and manufactured into farina for human beings.

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* C Johnson and J. E. Sowerby : "Useful Plants of Great Britain, 1862."

† P. Sowerby : " Grasses of Great Britain."

‡ E. Pott : " Handbuch der Tierischen Ernährung," II., 142.

§ J. M. Wilson : " Rural Cyclopedia," 1847.

"They contain nutritive matter of the same kind and nearly in the same proportion as potato tubers; they readily yield up that matter into the culinary and desirable form of a starchy powder resembling arrowroot."

There would appear to be no doubt that the cleaned rhizomes have frequently been fed satisfactorily to horses, cattle and sheep, and, in the boiled state, also to pigs. Writers give special prominence to its value as fodder for horses, for which purpose, as mentioned above, it is said to have been largely used in Italy and in Normandy.

The Hon. Florence Amherst, who has kindly supplied the Board with a number of references, states that she fed some of the chopped-up dried rhizomes to fowls, and found that they ate it quite freely. They would also eat it after boiling and mixing with meal.

The Board have been kindly supplied with an analysis by Mr. A. J. Jones, who obtained the following results from air-dried washed rhizomes freed from rootlets:—

	Air-Dried Material. Per cent.	*Dry Matter.* Per cent.
Moisture	15·00	—
Crude protein	4·96	5·83
Oil	0·61	0·72
Woody fibre	19·84	23·34
Ash	3·07	3·61
Soluble carbohydrates, etc. (by difference)	56·52	66·50
	100·00	100·00

More than one-half of the dry matter was soluble in cold water.

Assuming digestibility equal to that of average meadow hay and that 80 per cent. of the crude protein is true protein, the starch equivalent (production) of the air-dried material will be 39 per cent., or rather higher than the average for hay. The protein-content, however, is only about one-half that of meadow hay. The feeding value must therefore depend mainly upon the sugar, gum and starch which compose the bulk of the carbohydrate.

The chief difficulty in securing the use as food of the couch removed from the land in the ordinary cleaning operations will be the necessity for washing and drying. There seems, however, to be a reasonable *prima facie* case for directing attention to this possible source of additional food for farm stock, including pigs and poultry.

Experiments are being made to determine the value of dried couch-grass as fodder. Preliminary tests indicate that it is not readily consumed by cattle or sheep, but that pigs will consume it freely even in the unwashed condition. The Board suggest, therefore, that farmers when cleaning their land should collect the couch-grass, and instead of burning it should store it when dry with a view to using it for feeding. Should the couch-grass be found as the result of experience to be unsuitable for feeding alone, it would be of use, in view of the shortage of feeding stuffs, to mix with other fodder, and in any case, if shortage of labour and other circumstances preclude its utilisation in this way, it can afterwards be burnt as is now done or, better still, rotted down as a compost for manure.

Castor Bean Meal Feed for Pigs.

IN order to determine the value or otherwise of the residue of castor bean after removal of the oil as feed for pigs, trials have recently been conducted by the Veterinary Department of the Board. The chief object of the experiments, however, was to test whether the toxic properties of the residue, which are due to *ricin*, had been removed by submitting the residue to a high temperature. The cooking process was carried out by the manufacturers, and it should be understood that the results refer only to the consignment supplied for the trials. Ten pigs were brought on to the premises on 31st May, 1917, when about four months old, and feeding observations commenced on 14th June. The pigs were divided into four lots, viz. :—

Lot 1.—3 pigs—to be fed with the meal mixed with treacle.
,, 2.—2 pigs—to be fed with the meal (plain).
,, 3.—3 pigs—controls to Lot 1, fed on ordinary foodstuffs.
,, 4.—2 pigs—controls to Lot 2, fed on ordinary foodstuffs.

Lots 2 and 4, believed to be from one litter of pigs, consisted of older and larger pigs than Lots 1 and 3 (also from one litter). The castor meal was mixed with cold water, to which nothing else was added.

For the first 10 days Lots 1 and 2 refused to eat up the meal served to them, but nosed it about a good deal. They ate very little, and for the greater part of the time were content with drinking only the fluid. On the eleventh day one pig from Lot 2 died in an emaciated condition. The trial was continued for a month until, as the pigs never cleared up the meal and were losing condition, the meal by itself was discontinued.

It was then arranged to mix the castor bean meal with the ordinary feeding stuffs, which contained a proportion of good house-wash or swill, and that if the pigs cleared up the food the amount of castor meal served should be gradually increased, until they would either take it by itself or up to a certain percentage. As a commencement only a small quantity of castor meal was added, and a speedy improvement in condition was noticed, the animals at once putting on weight.

The feeding observations on these pigs closed on the 5th October, when they were slaughtered for food (with the exception of one pig in Lot 3 slaughtered on 27th September). The dead weights given below are those of the dressed carcasses in every instance, and include the weights of all edible offals. The live weights were ascertained by weighing each pig in a sack and deducting the weight of the sack. The pigs in both Lots were fed for 112 days.

The amount of meal mixed with treacle fed to the three pigs (Lot 1) during the first half of the period, viz., 56 days, was 112 lb., an average daily amount of 2 lb. between them, or 10⅔ oz. each, and during the following 56 days 448 lb., an average daily amount of 8 lb. between them, or 2⅔ lb. each.

The amount of plain meal fed to one pig in Lot 2 (and to the second pig which died on the 11th day) during the first half of the period, viz., 56 days, was 84 lb.—an average daily amount of 1½ lb., and during the next 56 days 263 lb., an average daily amount of about 4⅔ lb.

At the time of the slaughter both lots of pigs were thick " stocky " pigs and carried a good deal of fat.

House-wash of good quality was used for mixing the meals, an average of 2 lb. of meals per day for each pig being added. The larger the pig the more it received in proportion. For the pigs under observation the more liquid portion of the wash was taken, to which castor meal was added. In a considerable degree the castor meal was additional to the usual and ordinary food fed to the other pigs, including the control pigs.

It was observed that pigs fed entirely on either form of castor bean meal mixed with plain water will not touch their food for several days together, although freshly-mixed food be given every day or every other day. In fact the pigs rapidly lost condition and assumed an empty and dejected appearance. They seemed likely to succumb to starvation rather than partake of the whole meal. With the addition of good house-wash, which had been boiled and mixed with other meals, a considerable amount of castor bean meal could be given to the pigs and would be eaten.

It also appeared that animals had a greater dislike to the treacled form of meal than to the plain meal.

In no instance was any poisonous symptom observed.

SUMMARY OF WEIGHTS OF PIGS.

(Fed on Castor Bean Meal from 14th June to 4th October.)

No.	Live Weight, 14th June	Live Weight, 8th Aug	Live Weight, 19th Sept.	Dead Weight, 5th Oct.	Estimated Live Weight at 23 per cent. Loss* when Dressed.
	LOT 1 —3 *Pigs Fed with Treacled Castor Bean Meal.*				
1 ..	Not taken ..	69 lb	120 lb.	100 lb	131 lb.
2 ..	,, ..	77 ,,	136 ,,	123 ,,	159 ,,
3 ..	,, ..	69 ,,	134 ,,	124 ,,	160 ,,
	LOT. 2 —2 *Pigs Fed with Plain Castor Bean Meal*				
1 ..	Not taken ..	123 lb.	177 lb.	166 lb.	215 lb.
2 ..	,, ..	Died (25th June)	—	—	—
	LOT 3 —3 *Pigs (Controls to Lot 1) Fed on Ordinary Foodstuffs*				
1 ..	Not taken ..	109 lb	169 lb	(27th Sept) 140 lb.	181 lb
2 ..	,, ..	93 ,,	154 ,,	140 ,,	181 ,,
3 ..	,, ..	Died (12th July)	—	—	—
	LOT 4.—2 *Pigs (Controls to Lot 2) Fed on Ordinary Foodstuffs.*				
1 ..	Not taken ..	123 lb.	168 lb.	154 lb	200 lb
2 ..	,, ..	93 ,,	129 ,,	118 ,,	153 ,,

* For the larger and heavier pigs 23 per cent. difference between live and dead weight is somewhat too high.

Bracken Poisoning in Cattle.

A PAPER recently published by Sir Stewart Stockman, the Board's Chief Veterinary Officer, deals with suspected deaths of cattle through bracken poisoning which have been reported to the Board in recent years. Investigations as to the effect of feeding cattle on bracken have been made at the Board's Veterinary Laboratory. The deaths were found to occur in the autumn, but the evidence against bracken was only circumstantial, and depended mainly on the observations that the animals had died and that they had eaten or had had the chance of eating bracken. The symptoms were generally a high temperature, loss of appetite, a trickling of blood form the mucous membranes of the eyes, nostrils and vagina, passage of very dark and foul dung, sometimes mixed with blood clots, blood-swellings under the skin, occasional lameness, and finally coma; while lesions, consisting of hæmorrhages, were observed in different parts of the body on post-mortem examination. Death usually occurred from 12 to 72 hours after the first appearance of the symptoms. It was pointed out that the symptoms and lesions of the diseased condition were so constant that it was highly probable that they were due to the same agent in every case.

There was a good deal to be said against the view that these outbreaks were due to eating bracken. The number of animals visibly affected, although considerable, was small in proportion to the distribution of the weed around pastures, and it was observed that in herds of cattle in which the disease had appeared cases might continue to arise for about a fortnight after the survivors had been removed from the pastures and excluded from further contact with bracken, thus diverting suspicion from it. There was also the probability, suggested by the constant symptom of very high temperature, that the outbreaks were due to contagion, rather than poisoning.

From the first experiments carried out the direct evidence in support of the suspicion of death from bracken was far from satisfactory. In two experiments in which two heifers were fed respectively on 56 lb. of bracken over a period of nine days, and 60 lb. over a period of seven days, negative results were obtained. but it was thought possible that too small an amount had been consumed over too short a period. At a later date a further experiment was undertaken with a view to testing the effect of prolonged feeding of comparatively small quantities of bracken given with other food. A bull calf over a period of 29 days received approximately 260 lb. of the fronds of green bracken (about 10 lb. per day with other food). This resulted in a fatal termination. The animal showed identical symptoms during life, and identical lesions on post-mortem examination, to those seen in cattle dying in the field of practice of suspected bracken poisoning. It is concluded to be not improbable that bracken contains a small amount of a poison which is able to accumulate in the system, and which requires a certain time to produce its full effect, after which severe illness may begin in an explosive manner, may be some weeks after the poison has been withheld. It is also pointed out that until bracken has been submitted to an exhaustive chemical investigation only suggestions can be made regarding the toxic principle.

Since the distinct symptoms appear suddenly, and do not seem to arise until the poison has definitely produced its action on the system, it is highly improbable that any therapeutic measures would be successful in declared cases. Preventive measures, however, even at this stage of our knowledge, offer some promise of success, notwithstanding the difficulty of eradicating bracken from pastures or discontinuing its use as litter in some districts (it has no great value as a foodstuff). It seems probable from practical observation that individuals vary in susceptibility, since some cases develop later than others in the same herd; some animals on the same pasture even seem to be highly resistant, and may not show the least sign of illness, whilst others are dying around them. It is at least possible that the former animals have acquired resistance by a natural process of immunisation, as may happen in the case of poisons of the ricin class, and that only those succumb which have too brusquely and continuously fed upon the poisonous substance, with the result that they are fatally attacked before acquired resistance can establish itself. It is important to bear in mind that the poison does not develop its explosive potentiality for some weeks, and that the feeding must be continuous up to a certain point to bring it about. Given, then, a declared case of poisoning, or evidence that cattle have been continuously browsing the green fronds of bracken at pasture (and this should be looked for in the autumn), or that they have been freely consuming bracken given as litter,* no time should be lost in interrupting the continuity of this feeding by changing the pasture or litter, as the case may be, and giving the animals time to excrete the accumulated poison from the system before re-exposing them to contact with bracken, if it be necessary to do so. The administration of oleaginous purgatives may also help in the excretion of the poison.

Inspection of Steam Engines.

DURING the last threshing season the boiler of an engine used solely for threshing purposes exploded, resulting in the death of the driver and injuries to two men. A Board of Trade inquiry was held, which showed that the explosion was due to the condition of the firebox, the top of which was worn so thin that it was unable to withstand the normal working pressure of the boiler. The boiler was not insured and had not been inspected by an expert since 1905. If adequate inspections had been regularly carried out there can be no reasonable doubt that the wasting of the firebox would have been detected. The boiler was, however, entrusted to the care of an attendant who, while he had considerable experience in driving steam engines, was quite unqualified to ascertain whether the boiler was suitable for the steam pressure at which it worked.

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* It has not yet been definitely settled that bracken is poisonous to cattle after drying, though it seems wise to assume on the evidence that it may be.

All owners of steam engines used for threshing and other agricultural purposes should see that the boilers and mountings are periodically examined by an expert who can suggest any repairs necessary to secure safety in working. The easiest way to arrange for inspections is to insure the boiler with an Insurance Company specialising in this class of business. The insurance covers regular inspections and by this means expert advice is periodically obtained as to any repairs or renewals necessary to secure safety in working. An initial inspection is carried out before the premium is determined, but the amount is usually quite small.

Women's Work on the Land.

Land Women's Tests.—The land women's tests held during the last few months at Edgbaston (Birmingham), Maidstone, and Rhuddlan (for North Wales), have had the double effect of stimulating the recruiting of women for land labour and inducing farmers to utilise such labour more freely. Its excellence was amply demonstrated at the recent Rhuddlan meeting. All the North Wales counties were represented among the 238 competitors ; and all the classes, except two, were confined to competitors working on the land in North Wales. The daughter of a Wrexham farmer won the first prize in the closed and open classes for horse-ploughing ; and one competitor from Shropshire won the third prize in horse-ploughing and one from Kent the third prize in thatching. Anglesey and Denbighshire took three firsts each and also won totals of eight prizes each ; Flintshire took two firsts and a total of seven ; Montgomeryshire one first and a total of three ; whilst Carnarvonshire only won a single third. About £60 was given in prizes, which took the form of War Bonds. The work done was of a very high standard all round, and the 2,500 persons present expressed their keen satisfaction.

On Thursday, 28th February, at Appleton Hall, Warrington, by kind permission of Lieut.-Col. Lyon, an efficiency test for women farm workers in Cheshire, Lancashire, and Westmorland was held under the patronage of Mr. Prothero, Sir Arthur Lee, and many well-known North Country agriculturists, as well as the Lord Mayors of Liverpool and Manchester and the Mayors of Appleby, Chester, Kendal, Lancaster, Preston and Warrington. Here, again, the work of the women was of very high merit in competitions representing practically all the varied activities of farm and food garden. An exhibition of village industries, a communal kitchen, cheese-making, lectures on vegetable-preserving and canning, rabbit-keeping, goat-keeping, mat-making, needlework and an exhibition of dried herbs, fruits, and vegetables were among the other features of an excellent day's programme.

Women Land Workers' Club.—A concert organised by members of the Women's Land Army (" Lasses ") at Llanrwst resulted in the raising of over £2 towards equipping a club-room for women land workers.

A Veteran Woman Worker.—At a recent test meeting in Wales a woman of 62 competed in the horse-ploughing, milking, hedging and pruning competitions. She has lost two sons in the War and her husband is an invalid. She failed to secure a prize, but at the close of the meeting a collection was made for her which realised over £14.

Recruiting the Land Women.—The " Lasses " (Women's Land Army) have received a fair number of recruits as a result of the attention directed to this branch of National Service by the Exhibition of Women's War Services at Harrods; but many more women are wanted at once to help in the work of food production. New training centres are being opened in various parts of the country; and the reports received as to the women already placed on the land are invariably most favourable. In Yorkshire women are being trained to work with Government teams of horses.

The Women's Institutes.—Twenty new Women's Institutes were started during the last two weeks in February. The Institute at Lamberhurst (Kent) has been asked by the District Council to manage a communal kitchen. The market stall at Chelmsford run by the local institute is proving successful. Neighbouring institutes have undertaken to supply garden stuff regularly which will be dealt with on co-operative lines.

The Woman Foreman.—A village woman at Castor, working on the land as a forewoman on piece-work rates, says that she has earned as much as 6*s.* per day.

"*The Best Man.*"—A farmer in Lincolnshire describes his Women's Land Army worker as "the best man" he has. The Instructor at a Women's practice farm at Garforth (Yorks) says that two of the girls now receiving instruction there are each as valuable as a man would be, for the same class of work.

THE following Note has been communicated to the Board by Mr. A. Harbord:—

The Hardy-Thrifty-Grazing Pig.

This Note may interest some of those who, in these times of stress, are endeavouring to solve two interwoven problems—salving their pig-breeding stock and avoiding the bankruptcy court in so doing.

The farm—heavy flinty clay—is situated 650 ft. above sea level, and though in the south is very bleak and exposed. In this limited and circumscribed area we have just come out of a month's severe experience, unequalled for some years—blizzards, with snow 6 to 9 in., and continuous and intense frost, which on one day at least sent the thermometer down to zero.

Thirty gilts, mostly reserved for my own herd, 7 to 9 months (ringled), were transferred in early December to an 8-acre pasture, with rough, cheap hovel for shelter, containing several young standard fruit trees, and therefore barred to bullocks. The grass was extremely rank and coarse, from 1½ to 2 ft. high, largely cocksfoot, which sheep would not tackle.

The pigs were doing excellent service by tearing out this growth and consuming it, when the snow came—a condition which apparently only increased their liking for it; for they spent many hours daily in getting at the fleshy, succulent stems deep in snow, and obviously enjoyed their finds and filled themselves.

The amount of concentrated feeding mixture given daily was 1½ lb. per head actual weight. The cost of the purchased food (average), carriage and cartage included, was £17 per ton, or under 2*d*. per lb. Thus the cost of purchased food per head per week was 1*s*. 9*d*., from which should be deducted the manurial compensation value of the feeding-stuff used, to which any out-going tenant would be entitled.

Of the 30 gilts, all bred from grazing stock, half at least were at the time of writing in sufficiently good condition to satisfy the average pork butcher, the remainder being in capital thriving store condition. In addition to food already mentioned two medium-sized mangolds were given daily.

As to the sows, almost exclusively pasture fed, these which farrowed (all in hovels on pasture) during the blizzards and bitter weather have done well. Not a piglet has been lost thereby. The last two litters numbered 10 and 12 respectively. Each sow with litter received concentrated food, 2½ to 3 lb. daily, costing 5*d.* to 6*d.*, two mangolds, and a cabbage.

The earliest litters were already (February) beginning to graze and eat trough food, unaffected by their frequent early excursions in deep snow and excessively low temperatures, and were thriving in a most pleasing manner.

Experience has taught the writer to value these early January farrowings, rendering the very much desired July farrow a certainty, with strong 16 to 20 weeks old youngsters to face the rough, wintry, out-door life intended for them.

Note, dated 11*th March,* 1918.—Several excellent litters—mostly tens—now grazing in a most business-like way, will be weaned during the present and following weeks. The importance of this fact to the breeder can scarcely be overestimated.

THE following recipes for cooking hop sprouts have been communicated to the Board:—

Use of Hop Sprouts as Food.

Break off the tender sprouts above the fibrous part, and (1) wash in cold water when preparing for use. Place in a saucepan with plenty of cold water, pepper and salt. Boil with a sprinkling of vinegar until they become soft (about half an hour). In another saucepan melt a small piece of butter, add some flour and milk and stir together with pepper, salt and a little fresh lemon juice. Add the sauce to the hop sprouts and warm, without boiling, for a quarter of an hour on the side of the fire. When about to serve, add a small piece of butter. Serve with poached eggs or scrambled eggs.

(2) The hop sprouts can also be eaten as hors d'œuvre, after simply boiling in water with pepper and salt. Serve cold with vinegar and oil.

(3) The sprouts may also be preserved submerged in salted water in air-tight bottles. This method would be useful if the quantity put on the market were too great for immediate consumption.

(4) According to a note supplied by the Ministry of Food, hop shoots can be cooked exactly like spinach, that is, boiled in very little salted water, and served whole or chopped up finely. In the latter case a little cooking fat in which a small finely-chopped onion has been fried to a light brown colour should be blended with it. They can also be cooked in salted water tied up in small bundles.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders mentioned below may usually be obtained at the price of 1*d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C.* 2, *and* 28, *Abingdon Street, London, S.W.* 1 ; 37, *Peter Street, Manchester ; and* 1, *St. Andrew's Crescent, Cardiff.*)

Late Publication of the "Journal."

THE Board much regret the unavoidable delay which has recently occurred in the publication of this *Journal*, normally due on the 15th of each month. This delay is due in part to shortage of labour in the printing trade, and other circumstances arising out of present abnormal conditions, and in part to the fact that the *Journal* is not only in itself much larger than its normal 96 pages (the February issue was 168 pages and the present issue is 156 pages), but is in greater demand, the circulation having much increased in the last year or two, so that the labour of printing and publication is far heavier. For these reasons it is not possible at the moment to guarantee publication on the 15th of the month. Every effort, however, is being made to ensure delivery at the earliest possible date, and it is hoped that after the issue of the present number earlier publication may be ensured.

An attempt is made to include the latest possible statement on any subject of immediate importance, together with the latest official Notices and Circulars.

The Board trust, therefore, that readers will be as lenient as possible in view of the abnormal conditions under which the *Journal* is produced.

The Breaking Up of Grass Land in the Occupation of Dairy Farmers.

THE following Letter (No. 3/T.), dated 14th February, 1918. has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

SIR,—The Department is sometimes asked whether it is in the national interests to require dairy farmers to break up grass land if this involves the sale of part of their herd. While the answer must be governed in particular cases by the extent to which the proposed cultivation would reduce the summer stock-carrying capacity of the farm, it is possible to indicate certain general principles which may be of assistance to Committees in scheduling land for arable cultivation.

The Board are not prepared to accept the general statement that the ploughing up of a portion of the grass upon a dairy holding and its cultivation with corn must necessarily be accompanied by a reduction in the milk herd carried upon the farm. By adding further to the area ploughed up green crops can be grown, vetches, rape, and maize in the warmer parts of the country, which will provide green food to replace the grass that has been lost. These crops in particular are often of great help to the producers of summer milk since they provide food at a critical period of the year when the pastures are often deficient through drought.

Another aspect of the case is of importance. The production of winter milk is now of even greater national importance than the supply of summer milk. Even under peace conditions the provision of a sufficient supply of winter milk for large cities was often difficult, and in view of the present shortage of feeding stuffs, and the impossibility of securing full supplies until after the War, radical changes in dairy management are called for if a serious deficiency in the country's supply of winter milk is to be avoided.

Since feeding stuffs cannot be purchased in the necessary quantities, dairy farmers must look forward to breaking up part of their grass land and cultivating crops suitable for feeding to cows in the winter months.

The breaking up of pasture may render necessary the sale of some cows, but this need not be regarded as an objection if the keeping of fewer cattle in summer will enable the farmer to provide a greater quantity of cow food in winter, since there is no immediate prospect that the supply of summer milk will give rise to difficulties comparable with those attending the winter supply.

The ease with which milking cows may be maintained on pasture leads farmers under ordinary conditions to arrange for the calving of their cows at a time when full advantage may be taken of grass. At the present time dairy farmers should be urged to rearrange their herds and bring in heifers and cows due to calve in the late autumn and winter, so as to enable them to take a part in winter milk production.

When scheduling grass for ploughing on milk-producing farms, the occupiers should be allowed a free choice of crops in cases in which they are prepared to develop winter dairying. On the other hand, the dairy farmer who aims at supplying summer milk only should be allowed similar cultivation tasks to graziers or farmers of mixed holdings, who are being required to grow crorn, potatoes or roots; for, under existing conditions, the supply of summer milk is likely to cause even less difficulty than the supply of these food crops.

In view of the very limited stocks of feeding stuffs, the conversion of part of their grass land into tillage is likely to prove an advantage even to the owners of all dairy herds, summer and winter.

Committees should encourage dairy farmers to sow such crops. The sowing of lucerne in preparation for 1919 and subsequent years should also be encouraged for this purpose.

I am, etc.,
(Signed) ARTHUR LEE,
Director-General of Food Production.

Note.—Information on this subject is contained in Food Production Leaflet No. 7 (*Maintenance of Supplies of Hay and other Fodder Crops*) and Technical Bulletin No 1. (Series C) of the Food Production Department (*Production of Winter Keep on Grass Dairy Farms.*)

THE following Letter (No. 30/C. 1), dated the 28th February, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

Crops on Newly-Ploughed Grass Land.

SIR,—I am directed by the President of the Board of Agriculture and Fisheries to call the attention of your Committee to the desirability of allowing some latitude as to the crops to be grown on grass land which is scheduled for ploughing. The Committee are aware of the great importance which the Government attach to a large increase in the potato crop, and Mr. Prothero thinks that any occupier who desires to do so should be permitted to grow potatoes on grass land which he is required to break up.

I am also to say that, as was stated in the Director-General's letter of the 14th instant (No. 3/T.), dairy farmers who are prepared to develop the production of winter milk should be allowed a free choice as to the crops grown on any grass land broken up on their farms, in order that if they so desire they may be able to grow roots and forage crops for the feeding of their cows during the winter.

I may point out that in the Department's Circular Letter of the 14th June, 1917,* in which the quota for your county was stated, you were informed that the area of permanent grass to be broken up had been estimated as sufficient to provide not only for the increased corn area desired, but also for the necessary increase in the potato crop and in the fodders required for the production of winter milk.

I am, etc.,
(Signed) F. L. C. FLOUD.

THE following Letter (No. 9/F.), dated the 12th February, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Charges for Tractor Ploughing.

SIR,—I am directed to inform you that the attention of the Food Production Department has been drawn to the fact that in certain counties contracts are still being arranged with farmers for land to be ploughed by the Government tractors at rates below those set out in the Department's Circular Letter of the 22nd November.

In that letter it was stated that contracts for ordinary ploughing should not be made at less than 20*s*. per acre, and that when the depth of the furrow exceeded 6 in. in grass or 7 in. in stubble or fallow, an extra charge at the rate of 2*s*. 6*d*. per inch of additional depth should be made. In some counties, however, Committees are making a uniform charges of 20*s*. per acre for ploughing grass-land, even in cases where the depth of the furrow exceeds 6 in.

Committees were authorised in exceptional cases, where they were satisfied that shallow ploughing would appear to be in the interests of food production, to enter into contracts for the ploughing of light soils to a depth not exceeding 5 in. (and the skimming of stronger soils to a depth not exceeding 4 in.) at a charge of not less than 17*s*. 6*d*. per acre. In certain counties, however, this reduced charge of 17*s*. 6*d*. per acre has been adopted by the Executive Committees as the minimum for ordinary ploughing.

The scale of charges set out in the Circular referred to compares favourably with the charges made by private firms for ploughing by either horses, motor tractors or steam tackle, and they cannot be reduced without a heavy loss falling upon public funds. The Department must, therefore, insist on Executive Committees entering into no further contracts at rates below those above stated.

The charges made for cultivating by tractor have varied widely in different counties. The Department consider that the charge for cultivating should not, in any case, be less than one-third of the charge which would be fixed for ploughing the same land, and direct me to inform Committees that no contracts may be entered upon for cultivating at less than 6*s*. 6*d*. per acre, which represents merely the bare cost of labour and fuel.

I am, etc.,
(Signed) H. L. FRENCH,
General Secretary.

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* See this *Journal*, July, 1917, p. 455.

THE following Letter (No. 79/M. 1), dated the 26th February, 1918, has been addressed to Agricultural Executive Committees and Tractor Representatives by the Food Production Department of the Board:—

The Ford Tractor and the Oliver M.O.M. Plough.

It is essential that the "Ford" tractor should be used only with the new type Oliver M.O.M. plough which was specially designed to work with it, and which is supplied with each Ford tractor. The tractor and plough together must be considered as a unit, and on no account must this tractor be used with any other type of plough.

This new plough is giving great satisfaction, for both grass and stubble ploughing, in counties where it has already been tried, but if it should be found, after actual and practical trial, that it is unsuited for the conditions of any particular district, the tractor and plough should be moved to some other district where the soil and conditions are suitable. In the unlikely event, however, of this plough being found unsuitable for work in any part of your county the Department will arrange to withdraw both tractors and ploughs altogether, and to make use of them elsewhere.

(Signed) ARTHUR LEE,
Director-General.

N.B.—The attached report gives some indication of the qualities of this ploughing "unit" when used under proper conditions.

ENCLOSURE.—(*Report, dated the 9th February,* 1918, *received from the Harper Adams Agricultural College.*)

Considerable interest was evinced in the Tractor Ploughing Demonstration which, by the arrangement of the Harper Adams Agricultural College authorities, took place in the afternoon of Tuesday last on the College Farm.

The field selected, a grass field not previously ploughed for about 20 years, provided opportunity for thoroughly testing the capabilities of the Ford tractor and its special new type Oliver plough at the work of breaking up old turf.

One or two conspicuous features of the Ford tractor in combination with the Oliver plough were quickly remarked upon by the farmers present, who doubtless brought with them their experience of tractors gained during the last season or two. In the first place the combination eliminates the necessity for a plough operator, the control levers of the plough being accessible to the tractor driver from his seat.

Another feature that shows the attempt to cater for the average size of field in this country is the direct attachment of the plough to the draught-bar of the tractor, thus doing away with a draught-chain and shortening the whole outfit to 4½ yd. with consequent lessening of the necessary headland to 5½ yd. This method of direct draught brings the plough into the natural draught line which makes for ease in operation.

Special features of the Ford tractor are:—extreme accessibility of the engine parts, reduction of the lubrication parts to eleven oil-holes and grease-cups, and very responsive steering gear that permits of turning in a minimum space.

The Oliver plough, in addition to its being manipulated by the tractor driver, is singularly well equipped in the matter of adjustments.

The out lift at the end of the furrow is automatic, the lever actuated by the tractor driver simply engaging a curved ratchet on to a toothed cog carried by the land wheel of the plough, the forward motion of this wheel lifting the body of the plough clear from the ground. At this height the body is carried until further manipulation of the lever permits the body to drop and re-enter the ground.

Another lever, also accessible to the tractor driver provides for easy racking up or down of the furrow wheel to vary the depth while the plough is at work.

The work accomplished in turf burying shows the working parts of the plough to have been thought out equally as thoroughly as the carriage. A skim coulter turns in the upper layer of the turf, and at the same time keeps clean the surface of a swivel disc coulter which replaces the knife-form of coulter found on most ploughs. This combination seems to overcome the objectionable clogging between the coulter and the mouldboard which is apt to take place on so many tractor ploughs on account of their shortness of beam.

The mouldboards of the Oliver plough are well shaped and turn the furrow slice satisfactorily to a good depth. A depth of 8-9 in. was maintained satisfactorily throughout Tuesday's demonstration on level ground, second speed being used on the tractor.

The mouldboard is of a type and setting unusual in this country. Longitudinally it is concave, and transversely convex, while it is set out at an angle of 45 degrees.

The character of the ploughing produced is quite different from what one has been used to considering good lea ploughing, and resembles spade culture more nearly than has perhaps been possible previously. The newly ploughed land has the appearance of fallow land ploughed with a digging plough.

The land is left very light, and it is obvious that the ploughing must be followed by a discing to secure the necessary compactness, but an abundance of loose mould is produced which is not the case with the older system of ploughing. The character of lea ploughing produced is revolutionary, but there is every reason to anticipate that this type will be superior to the type of ploughing generally adopted.

THE following letter (No. 62/M. 1), dated 8th February, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Petrol and Paraffin.

SIR,—With reference to Circular No. 49/M. 8 of 28/1/18, and previous instructions on this subject. It has been found that War Agricultural Committees do not in all cases appear to understand their position as regards the supply of fuel, both paraffin and petrol, for use with agricultural machinery belonging to private persons. In addition, certain alterations in procedure have been made from time to time, and it is desirable that instructions should be consolidated. The following instructions have, therefore, been drawn up which will, it is hoped, make the position clear.

1. Applications for licences for petrol for use with agricultural machinery used for food production purposes are dealt with by Agricultural Executive Committees, who forward their recommendations to the Petrol Control Committee, 19, Berkeley Street, London, W., who issue licences in so far as the supply of petrol permits.

2. With regard to paraffin, it has been arranged that users of paraffin for agricultural purposes shall be given preference over ordinary consumers by the local distributing agents of the Oil Companies on the certificate of the Agricultural Executive Committee in whose area the consumer requires the paraffin.

The price of paraffin will shortly be controlled, therefore no arrangements are being made for its supply to private users of agricultural machinery at a special price.

It appears that large quantities of petrol are being used on privately owned tractors in some parts of the country, not only for starting up but also for ploughing. This must cease wherever practicable, as it is necessary to reduce the use of petrol to the lowest possible limits in order that this fuel may be available for the fighting services. Tractors can either now use paraffin for their work, or else can, and should be adapted, to do so.

There is grave risk that there may be no petrol available for tractors except for starting in the near future. Paraffin is cheaper, and the sooner the alterations to the carburettors are carried out the better for the owner of the private tractor. Agricultural Executive Committees will, therefore, only issue recommendations for the supply of petrol when they are convinced that paraffin cannot possibly be used in its place.

It is particularly to be emphasised that in making recommendations to the Petrol Control Committee for petrol for food production purposes, Agricultural Executive Committees should not take into consideration any demands for petrol for food collection or distribution purposes, as the former can and will obtain a separate licence for this from the Ministry of Food.

In making recommendations for the issue of petrol, Agricultural Executive Committees should make it clear to farmers that petrol is on no account to be used by them in cars for pleasure purposes in any way.

I am, etc.,
(Signed) Hugh M. Stobart,
Director, Machinery Supplies.

The following Memorandum (No. 43/L. 2), dated the 2nd March, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Horse Scheme, F. P. 92. Owing to the increased work which has been thrown on to the Horse Officers in many counties, owing to the formation of German Prisoner Ploughmen Camps, it has been found that the regular supervision and inspection of Food Production horses in some counties has to a large degree been dropped, as the Horse Officer has not the time to carry on his regular work. It is anticipated that in two months' time the organisation of the German Prisoner Camps will be on a fair way to completion, and consequently the Horse Officer will be freer and will be in a position to again take up his ordinary routine of work. In the circumstances enumerated above it has been decided that if any Executive Committee consider it necessary, a temporary Assistant Horse Officer may be appointed for a period not exceeding two months, who shall be paid a sum not exceeding 10*s*. per day when actually engaged on the inspection of Food Production horses in the county.

It is desired that this temporary assistant should be appointed where it has been found that it is impossible to obtain the services of voluntary Horse Officers in rural district council areas as outlined in F.P. 137, and that the work of inspection cannot be carried out by the Assistant Executive Officers who are being appointed in many counties.

THE following Circular (No 78/M. 6), dated the 27th February, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Organisation of Threshing Sets.

SIR,—A scheme will shortly be submitted to you in connection with the organisation of threshing sets in each county for the 1918 harvest.

There will, undoubtedly, be a great shortage of threshing sets, and I think you will agree that some steps should be taken immediately to secure, as far as possible, that every available set should be used to its utmost capacity in the autumn.

Would you, therefore, please arrange through your District Committee or any other way that you can suggest, for a census to be taken of every kind and type of threshing box, steam traction engine, and portable engine in the county.

We should like you, please, to include in this Return* only those steam traction engines which are at present available, and not those which have been loaned to the Forage Committee or any other Government Department.

We should like the name and address of the owner in each case, size and type of threshing box, and type of engine.

Your immediate attention to this will be greatly appreciated as we wish, if possible, to be in possession of these facts by the end of next week.

I am, etc.,
(Signed) E. W. ALLEN,
Director, Field Services

THE following Memorandum (No. 37/L. 2), dated the 27th February, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

School-boy Labour.

It is essential for the success of this Scheme that the demands of the farmers for this kind of labour should be ascertained definitely at as early a date as possible.

Many of the Agricultural Executive Committees have undertaken to recommend the appointment of District Representatives for school-boy labour, in order to obtain the necessary information and further the Scheme in other ways. The Representative of the Ministry of National Service would be glad to meet these District Representatives in order to expedite the Scheme. Would you therefore arrange a meeting at some central place, and write to Mr. A. P. Charles, Secretary, Central Harvest Committee, Ministry of National Service, Hotel Windsor, London, S.W. 1, as to the date and time of the meeting.

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* Not here printed.

THE following Notice was issued by the Board on the 9th March, 1918 :—

Concession to Farmers who Grow Extra Grain.

The President of the Board of Agriculture announces that, by arrangement with the Food Controller, any farmer who complies with all the Cultivation Orders served upon him by his Agricultural Executive Committee, and is prepared in addition to break up permanent grass land subsequent to the date of this notice, will be entitled to a licence enabling him to reserve for the use of his own stock *without any restriction whatever* any crop (except wheat) which he can satisfy the Executive Committee and the Local Representative of the Ministry of Food was grown on such additional land, provided he makes previous application to the Executive Committee and specifies the field or fields of grass he proposes to plough. The Executive Committee will, immediately on receipt of such application, issue a Cultivation Order covering the land in question, unless they decide, in any particular case, that the application is unreasonable.

THE following Circular (No. 8/H.), dated 5th February, 1918, has been issued by the Food Production Department of the Board :—

Local Authorities and Allotment Cultivation.

SIR,—May I refer to the appeal which was made by the Food Production Department last year to all Local Authorities to secure an increase in the number of allotments, and may I at the same time express my satisfaction at the notable addition which the energetic administration by Local Authorities of the Cultivation of Land Order has secured to the national food supply.

The food situation is now graver than it was last year, and it is again my duty to make an urgent appeal to Local Authorities for yet further efforts to be made to increase the number of allotments, and for these efforts to be made at once, as in this matter time is the essence of success. When it is realised that the produce from sixteen 10-rod plots should be sufficient to supply 100 people with a daily ration of ½ lb. of vegetables throughout the year, it will be understood how considerable is the contribution which allotment cultivators can make to local food supplies.

I am aware that in some districts the lack of suitable land has limited the number and extent of allotments, whilst in other districts the applicants for allotments have not in the past been forthcoming in sufficient numbers to take up the whole of the available land.

In the first case, it is suggested that, failing other suitable land, unoccupied garden ground attached to empty houses should be utilised. These gardens, it is true, cannot be taken by the Councils under the Cultivation of Land Order, but the Board of Agriculture have power to take possession of them under the Defence of the Realm Regulations, and the Food Production Department are prepared to consider sympathetically any definite proposals made by a Local Authority for securing their cultivation during the present emergency where it can be arranged without serious injury to property. The Food Production Department have established a staff of allotment inspectors for the purpose of assisting Local Authorities in the selection of land for allotments, and the services of these inspectors are at the disposal of Local Authorities who may have difficulties in obtaining land, in deciding between alternative sites, or in selecting suitable gardens for cultivation.

In those districts in which a sufficient number of applicants for allotments is not forthcoming, it is suggested that in co-operation with local organisations for food production, the Local Authorities should call for volunteers to cultivate additional land, and that the call might be emphasised by means of advertisement, posters, and a house-to-house canvas.

The essential thing to be borne in mind is that to meet the food situation redoubled efforts on the part of small cultivators must be made and made forthwith. Past experience shows that I can rely upon the Local Authorities to call forth and encourage these efforts, and thus to add to the many national services which they have so readily and so successfully performed.

Yours faithfully,
(Signed) ARTHUR LEE,
Director-General of Food Production.

THE following Notice has been issued by the Food Production Department of the Board :—

The Marketing of Surplus Produce from Allotments and Gardens.

The coming season should see one of the most interesting efforts in co-operation which has ever been made in this country. The object of this co-operation will be to prevent waste by ensuring the marketing of all the surplus produce raised by small cultivators. To get this done, co-operation on the part of everybody in the country is essential ; and the Food Production Department is appealing to all small growers who produce more than they need, all dealers and traders whose business it is to bring produce to market, all retailers who supply individual needs, and all consumers. Only by the help of all these members of the community will it be possible to insure that the individually small but collectively great quantities of surplus produce raised in allotments and gardens shall be distributed uniformly among the population.

Schemes for creating marketing organisations in each county have been prepared and are already being put into operation in some counties. These schemes, modified where necessary to suit local requirements, must be carried out in all parts of the country.

The essential part of every scheme is the establishment, in each village, of a collecting depot, to which all surpluses, however small, may be brought for packing and dispatching to market.

The Ministry of Food is giving the greatest encouragement to the scheme by undertaking to treat the potato crop raised by small cultivators in 1918 on an equal footing with the crops of potatoes grown on farms. Provided that the small cultivators in each district will combine so that their produce may be bulked and transport may be saved, the State will purchase all the surplus main crop potatoes grown on holdings, no matter how small. Each small grower will therefore be able, whilst retaining for his own use all he needs, to sell all he does not want.

It must be clearly understood that there is no question of commandeering the produce of small cultivators. The Food Controller is merely inviting recognised marketing organisations to sell their surplus produce to him if they wish to do so.

The Ministry of Food is prepared in a similar way to purchase surplus fruit grown by small cultivators. To ensure that the smallest surplus shall be used it will be necessary for the collecting depots to be linked up with one another, and all of them to be brought under a County Marketing Association.

Every household can help to make this scheme of co-operation a success. Let every housewife remember that the time to buy fruit and vegetables is in the natural time of harvest, and that it is the duty of everyone who has the means to lay up a winter store of vegetable food. The kitchen oven can lend assistance to the farmers and gardeners to help to defeat the enemy; for by its use perishable vegetables and fruit bought cheaply in times of plenty may be preserved for winter use by drying, canning, or bottling. If this legitimate and patriotic hoarding of perishable food is practised universally there should be little heard during the coming summer of plums remaining ungathered, or of gluts and waste of vegetables. Moreover, no stronger stimulus to the greatly needed increase in food production could be given than by the reasonable assurance that none of the food grown will be wasted.

The Food Production Department learns as the result of its inquiries that in certain localities small growers are now experiencing difficulty in disposing of surplus roots and vegetables.

When detailed information of such difficulties has been submitted to this Department the latter has been able in some cases to arrange for the disposal of the produce. In any similar case notification with full details should be made to the Department

THE following Memorandum (No. 26/C. 1), dated the 14th February, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Cropping of Market Gardens

The Department have had under consideration the question of the contribution that should be made by market gardeners to the increased food supply needed by the nation. It is recognised that the normal system of cropping practised by market gardeners results not only in high yields from the land, but also in what is probably, under peace conditions, the most profitable method of cultivation. The conditions brought about by the War, however, make it imperative that there should be a departure in some directions from existing practice, and the following suggestions are made as to the course which should be adopted :—

1. *Potatoes and Onions.*—In view of the need for obtaining early crops on the one hand, and of the cessation of imports of certain food products on the other, market growers should devote not less than ⅛th of their total area under market garden crops in the open to the growing of first and second early potatoes. Where the soil is suited to the onion crop, onions should be grown on as large a scale as is possible, and preferably (in order to economise seed) from transplanted seedlings rather than from spring-sown seed, but each grower should be free to exercise his own discretion as to the relative proportion in which these two crops are planted. It should be understood that the above proportion is to be regarded as the minimum, and also that the food situation is such that there is no limit to the area of market garden ground which could, with advantage to the nation, be devoted to these two crops.

2. *Perennials.*—No new beds for perennials should be prepared or planted. The beds of perennials of no considerable capital value should be replaced by food crops.

3. *Annuals.*—The area under annual flowers should not exceed one half of the total area devoted to annuals in 1914.

4. *Tomatoes.*—It is not suggested that the area under tomatoes should be curtailed.

5. *Asparagus.*—The area under asparagus should not be increased, but new beds equivalent to discarded beds may be planted provided that the ground from which old roots have been lifted is planted with a suitable food crop. All available and suitable ground which lies between existing asparagus beds must be interplanted with crops of food value.

6. *Herbs* —There should be no extension of the area devoted to culinary herbs

The food situation requires that every effort should be made by growers to raise vegetable crops which will come in before the main harvest. In addition to such crops as brassicas and other leaf vegetables, turnips, etc., growers are recommended to plant as extensively as circumstances allow, carrots, haricot beans, as for example, Dutch brown beans, so far as seed is available, for harvesting dry. Moreover, although not available for early use, the high food value of parsnips should be taken into consideration in schemes for planting. Where the system of cultivation allows of it and suitable varieties are grown, growers will be acting in the national interest by allowing a portion of their pea, bean and similar leguminous crops to ripen so that the seed may be harvested instead of marketing the produce in the green state.

The attention of growers is drawn to the advisability of successional sowing in late summer (July) of root vegetables for winter use : beet in particular, and also carrot and turnip.

The Department have decided not to make an Order under the Defence of the Realm Regulations enforcing the above suggestions, as it would have to be of a complicated character, and it is not desired to add to the number of Statutory Orders unless absolutely necessary. Moreover, some latitude should be allowed in special cases, but the Department rely on the patriotism and public spirit of market growers to respond to the national need by carrying out the suggestions to the full.

THE following Notice, dated the 16th February, 1918, has been received from the Agricultural Organisation Society :—

Co-operative Trading for Allotment Holders.

Most of the difficulties with which allotment holders have to contend can be effectively dealt with by co-operation, whether they concern the holding of land, the purchase of tools, seeds, fertilisers, and other requirements, or the disposal of surplus produce. Quite a number of allotment men have already realised this fact, and to the number of over 50,000 they have combined co-operatively in about 400 co-operative allotment associations, affiliated to the Agricultural Organisation Society. The progress of the allotment side of that Society—which also represents some 350 Farmers' Societies, with a turnover of nearly £6,000,000 annually—has been rapid ; but it would have been more rapid undoubtedly had it not been handicapped by the absence of a large central trading organisation through which supplies could be collectively obtained.

The Agricultural Organisation Society is now about to remedy this state of affairs as part of an entire reconstitution of its system of working. The existing Farmers' Central Trading Board is to be expanded into an Agricultural Wholesale Society and capitalised at £100,000. It will have a special Allotment Department for the supply of the requirements of Co-operative Allotment Associations; and these associations will elect a number of its directors, as well as subscribe a portion of the capital at the rate of 2 per cent. of the sales of each association plus 5*s*. per member, the latter sum to be paid in five annual instalments of 1*s*. each.

Representatives of the Reading, South West Ham, and Mid-Glamorgan Allotment Holders' Associations have been appointed to a Provisional Committee, which is at work on the new scheme—a scheme for which, by the way, Mr. Leslie Scott, K.C., M.P., Chairman of the Agricultural Organisation Society, Sir Owen Philipps, K.C., M.G., M.P., and Mr. F. D. Acland, M.P., Chairman of the Allotment Committee of the Agricultural Organisation Society, are mainly responsible.

The draft scheme has been discussed by a meeting of 120 delegates from Farmers', Gardeners', and Allotment Holders' Co-operative Associations, and enthusiastically adopted. Among the adherents to the scheme are several of the most important Allotment Federations in the country, notably the Bristol Allotments Federation, which alone has 8,000 members. In the opinion of many leading experts in allotment organisation who have been consulted as to details of the scheme, it will prove of enormous value to the whole allotment movement, as well as to the associations concerned with its immediate promotion.

Allotment men interested in the matter can obtain particulars by writing to the Head Office of the Agricultural Organisation Society, Queen Anne's Chambers, Tothill Street, Westminster, S.W. 1.

THE following Letter (No. 16/S. 5), dated the 21st February, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

The Production of Vegetable and Roots Seeds in the United Kingdom.

DEAR SIR,—The President of the Board of Agriculture is giving anxious attention to the general shortage of seeds from which we are now suffering, especially as it is likely to be accentuated during the coming two or three years. I am therefore directed to submit, for the careful consideration of your Committee, the following Memorandum, and trust that everything in the Committee's power will be done to increase seed production on the lines suggested therein.

Yours faithfully,
(Signed) LAWRENCE WEAVER,
Director of Supplies.

MEMORANDUM.

The practice of supplementing our supplies of home-grown seeds, by growing on contract abroad, has increased so much of late years that we are now largely dependent on foreign-grown seeds. Owing to transport difficulties and the shortage of seeds in the principal seed-growing countries, the foreign supplies required here for sowing this spring will be seriously curtailed, and, unless steps are taken at once to make good the deficit by increasing the production of seeds at home, the position as regards supplies for 1919 and 1920 may be extremely grave.

Owing to the difficulty of obtaining reliable statistics of the quantities of agricultural and vegetable seeds grown in this country or imported, the precise amount of increased production needed cannot be stated, but the high prices of all classes of seeds both at home and abroad prove a world shortage.

Provision must therefore be made not only to replace the deficit of imported seeds, but also to secure the additional seed needed for newly-ploughed lands, falling into rotation, and for the increased allotments. Our Colonies are also relying more than ever on the Mother Country for their supply of seeds, particularly of root crops to feed stock for shipment as meat to the United Kingdom.

Our home-grown supplies are also considerably reduced. The disastrous winter of 1916–1917 seriously reduced the yield of the 1917 harvest. Many of the root crops were lost, and those which survived were very unsatisfactory in amount.

Other causes which have contributed to reduced home-grown supplies are :—

1. *Shortage of Labour*—Seed growing requires considerably more labour than ordinary field work, and must be supervised by specially skilled men. The Army has absorbed a large number of both the labourers and the experts, and it has therefore been impossible to continue the work on a normal scale.

   (Steps are being taken by this Department with a view to obtaining special protection for seed experts, who still remain in their civil employ, and also for the release from the Army of certain of these men who are in a low category and at present serving in this country.)

2. *Prices.*—The prices fixed for wheat and oats, combined with the smaller amount of labour required to produce these crops, and the greater possibility of securing a satisfactory yield, make them a safer "investment" for the farmer than seed growing.

3. *Restrictive Measures*—In some counties it is necessary to procure a licence before crops may be grown for seed. This in itself is an indication that seed growing is under special control and produces amongst growers a feeling of insecurity.

The strenuous efforts now being made to increase the acreage under food crops, may cause the essential need for the production of seed to be forgotten.

Important as are food crops, they must not be secured at the expense of the acreage normally reserved for seed growing. It is as much in the national interests to grow seed as wheat.

With a view to encouraging the growing of seeds, the following suggestions are made for the consideration of Agricultural Executive Committees :—

1. Growers should be allowed to grow seeds without obtaining a licence.
2. In carrying out the ploughing programme care should be taken that the normal acreage reserved for seed growing is not interfered with:

Farmers should not be required to plough up land which is being used for seed growing.

(The total area involved is quite small, though in certain parishes, where the soil and climate are suitable, the proportion of land under seed may be considerable.)

3. Notices might be inserted in the county newspapers and placards displayed at markets, drawing attention to the importance of seed growing, and urging farmers to grow their usual acreages of seeds or even to increase these to a reasonable extent.

Growers might at the same time be assured that, within reasonable limits, seed growing will not be restricted or interfered with in any way.

4. Growers might be warned that they should not plough up seeds in order to sow what might appear to them to be a better paying crop until it has been ascertained whether such action is desirable in the national interests.

5. The seeds which it is most desirable to grow are turnips, mangolds, swedes, peas, beans, early cabbage, Brussels sprouts, broccoli, parsnips, carrot and onions.

THE following Notice was issued by the Food Production Department of the Board on 7th March :—

Onion Growing: Notice to Market Gardeners and Nurserymen.

Owing to the reduction of imports it is necessary to increase the crop of home-grown onions, and it is also important that whilst doing this the greatest economy in the use of seed should be practised.

In order to secure the necessary increase in the area under onions, the Food Production Department invites market growers and nurserymen to increase the acreage normally devoted to this crop. Owing to labour shortage the larger growers may be unable to add considerably to the area under onions, and therefore the Department looks to the smaller growers and to the nurserymen who are devoting land to vegetable crops to undertake a more extensive cultivation of onions.

The Ministry of Food has fixed the following prices (f.o.r. or f.o.b. to growers) :—

Early autumn (up to 1st November), £15, f.o.r., f.o.b.
Late autumn (1st November to 1st January), £16 10*s*., f.o.r., f.o.b.
Winter and spring (after 1st January), £18, f.o.r., f.o.b.

provided that growers can make the necessary arrangements in time.

The Department desires to encourage to the fullest extent possible the planting out of onion seedlings instead of the more wasteful practice of sowing in drills. Experienced growers who cultivate onions by transplanting are aware that it has many advantages over sowing. It economises seed (1½ lb. of seed will suffice to raise the plants for planting 1 acre as against 5 to 7 lb. required for sowing 1 acre). Transplanted plants also produce a bigger crop and are less apt to be attacked by fly. The extra labour required for transplanting is set off by the smaller amount of weeding which is required. It is therefore urged on growers on national grounds that transplanting should be practised wherever possible.

Nurserymen who undertake to grow this crop will have all the facilities in the way of frames and glass-houses necessary for the raising of seedlings. Market growers who have not these facilities should be able to co-operate with one another and with nurserymen or others in their neighbourhood for the supply of seedlings.

Where it is not possible to get seedlings raised locally the Food Production Department will be glad to put intending growers in touch with raisers of seedlings.

Sowings in beds or boxes in houses or frames in a minimum temperature of 40° F. and maximum 55° F. may be made at once, and in the case of these early sowings the seedlings require to be transplanted again into boxes or frames before planting in the open. Sowings in houses or frames may be made until the middle of March; in the case of later sowings a shift into boxes or frames will not be required.

Air should be given whenever weather conditions are suitable. The seedlings should be well hardened off towards the end of March preparatory to planting in April.

Plant at 4 in. apart in the rows with 1 ft. between the rows (or more if horse cultivation is to be practised), and in planting take care that the plants are not put too deeply in the soil, which should be pressed firmly about the roots.

Full details as to best methods of marketing can be had on application.

For the benefit of those who have not hitherto grown this crop the following varieties, so far as seed is available, are suggested .—

James Keeping.
Giant Zittau.
White Spanish.
White Globe.
Bedfordshire Champion.
Strasburg or Brown Spanish or Deptford.
American Southport.
Ohio Yellow Globe.

In the present scarcity, the prejudice which is so generally entertained against the cultivation of red onions should be ignored, and these hardier varieties should be planted particularly in the colder areas and in the stonier soils.

Red Wethersfield. Blood Red. Red Globe.

Seed required for transplanting	1½ lb. per acre
For sowing in drills	5-7 „ „

Those who require further information should aply to the Food Production Department, 72, Victoria Street, London, S.W. 1.

THE following Notice has been issued by the Food Production Department of the Board :—

Sunflower Cultivation: How to get Seed.

The seeds of the giant strains of sunflowers are rich in oil and are also a valuable food for poultry.

The attention of the flower growers, florists, and private gardeners who possess glass-houses where young plants could be raised for planting early in May, is called by the Food Production Department to the desirability of growing areas of these plants. A warm, sheltered aspect is necessary, and a deep, well-worked soil; and for these reasons the Ministry of Food and the Food Production Department are desirous of encouraging on the largest possible scale, the cultivation of sunflowers on ground which is not suitable for food crops.

The only seed available in quantity is the American Giant strain. Seed may be obtained from leading retail seedsmen at a price which should not exceed 3*d*. per oz., 9*d*. per 4 oz., or 1*s*. 3*d*. per 8 oz. One ounce is sufficient for 8 rods; and 1½ lb. will plant an acre.

The Food Controller will be prepared to purchase ripened seed in quantities of ½ cwt. and upwards, at a price to be arranged later. The yield, which will depend upon the season, of course, should be at the rate of not less than 12 cwt. per acre.

It is important that only vacant land be used, and this culture is not intended to interfere with the planting of food or forage crops already arranged for.

Full information as to cultivation and harvesting can be obtained from the Food Production Department, 72, Victoria Street, S.W. 1.

Rationing of Live Stock: Priority Plans Extended.

IT was officially stated on 21st March, that proposals are under consideration for an extensive scheme for rationing all live stock through priority certificates. Pending the completion of this scheme the Food Controller is extending to certain other classes of live stock the existing system of priority certificates under the Cattle Feeding Stuffs (Priority Supply) Order, 1918, which are now granted only to dairy cattle in milk. These additional classes, and the maximum quantities of feeding-stuffs under the certificates, are:—

Calves under six months old, ½ lb. per day.

Horses maintained and used for agricultural purposes, 10 lb. per day.

Breeding sows, 4 lb. per day.

Store pigs, 1½ lb. per day.

In granting certificates the amount of feeding stuffs in the possession of the applicant will be considered, and in the case of sows and pigs no guarantee can be given that certificates can be granted for a supply during the summer months. Applications for these certificates should be made in all cases to the Live Stock Commissioner* for the area of the applicant, from whom the necessary form of application can be obtained.

Supply of No. 1 Northern Manitoba Wheat for Seed Purposes.

THE following Circular Letter (No. 18/S. 2), dated the 27th February, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

SIR,—The Royal Commission on Wheat Supplies has offered to place at the disposal of this Department a quantity of No. 1 Northern Manitoba wheat for seed purposes, and the Department propose to make arrangements to supply this wheat to farmers who may desire to obtain it.

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* See p. 1471.

In the first instance the Department will be much obliged if you will kindly furnish them with an estimate, on the enclosed form,* of the quantity which is likely to be required by the farmers in your district. In this connection, however, I am to point out that, as indicated in the enclosed note (*see below*) prepared by Professor Biffen, Northern Manitoba wheat is not suitable for every kind of soil. The Department do not propose, therefore, to recommend its indiscriminate distribution throughout the country, but your Committee will be able to judge, from their knowledge of local conditions, whether it is desirable to use this wheat for sowing in the county.

I am to add that it is proposed to use the machinery set up for the distribution of seed oats in connection with the supply of such quantities of Northern Manitoba wheat as may be required in your county. The Department would be glad if your Committee would invite selected agents in the county, who may be desirous of obtaining supplies, to address inquiries to the Director-General, Food Production Department, 72, Victoria Street, S.W. 1.

The price will not exceed 110*s.* per qr. of 480 lb., bags extra.

I am, etc.,
(Signed) PERCY G. DALLINGER,
For Director of Supplies.

ENCLOSURE.

Seed Wheat for Spring Sowing.

The Department have made arrangements through the Royal Commission on Wheat Supplies to distribute a limited quantity of No. 1 Manitoba Hard Seed Wheat for sowing. Particulars may be obtained on application to the Director-General, Food Production Department, 72, Victoria Street, London, S.W. 1, and the envelope should be marked in the top left-hand corner "Potatoes and Cereals Section—Wheat."

Advice to Prospective Purchasers.—The following Note on the use of this variety has been communicated by Professor R. H. Biffen :—

The variety has not the capacity some wheats seem to possess of doing well on most types of soil On the whole it is best to consider it as a light land wheat. The best crops have been produced on the brick earths of Kent and on medium loams. The lighter loams, brashy limestone soils and even sandy soils, suit it but it does not appear to do well on heavy loams and clays. Good crops have been grown experimentally in most counties of England, but a consideration of all of the available data indicates that the best results have been obtained with this variety south of a line drawn from the Wash to Shrewsbury.

The first grade of Manitoba Hard as a rule consists entirely or almost entirely of a wheat known as Red Fife. This has been grown on a comparatively large scale for the last twenty years or so in some parts of the country, more especially in Worcestershire, Gloucestershire and Herefordshire. An extensive series of experiments have been made with it in most parts of the country, and there is now no doubt that for spring planting this variety possesses several valuable characteristics. An analysis of the results of these trials shows that, on soils which suit it, it is capable of producing satisfactory crops. The average yield, calculated over a series of years, varies from 26 to 28 bush. per acre.

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* Not here printed.

Yields of well over 32 bush. are common, and in one case a yield of no less than 52 bush. per acre is reported from a sowing made after the middle of April. This date indicates one of its most valuable features, namely, that it can be sown long after any other wheat except April Bearded. Sowings made up to the middle of April can be relied upon to ripen soon after the ordinary autumn-sown crops. If necessary, in favourable districts the crop can be drilled even later, though this of course cannot be reommended.

The grain is smaller than that of most English wheats, and consequently it should not be sown more thickly than at the rate of 3 bush. per acre.

Note.—It is possible that some recleaning may be necessary, and the wheat is sold by the Department on this understanding.

THE following Notice has been issued by the Food Production Department of the Board :—

Supplies of Canadian Wonder Beans.

The Food Production Department desires to draw the attention of Allotment Associations and other similar bodies to the fact that supplies of "Canadian Wonder Beans" are now available through the ordinary trade channels. Associations who are unable to obtain supplies from the retail seedsman or merchant with whom they usually deal should communicate with the Food Production Department (Seeds Section), 72, Victoria Street, S W. 1, stating the name of the firm, who will then be informed where wholesale supplies may be purchased.

THE following Order (No. 188), dated the 11th February, 1918, has been made by the Food Controller :—

Potatoes Order, 1917: General Licence.

The Food Controller hereby authorises, notwithstanding the provisions of Clause 10 of the Potatoes Order, 1917, sales of and dealings in potatoes of any of the varieties mentioned in such Clause ("King Edward," "Arran Chief," "Langworthy," "What's Wanted," and "Golden Wonder") except sales of and dealings in potatoes of the "King Edward" variety, grown on warp, limestone marsh, or silt lands in any of the counties of York, Lincoln, Cambridge, Norfolk, Huntingdon, Hertford, Warwick, Worcester, and Notts, by a grower whose whole acreage of potatoes of all varieties in those counties in the year 1917 exceeds 5 acres.

THE following Order (No. 204), dated the 20th February, 1918, has been made by the Food Controller :—

The Potatoes (Distribution) Order, 1918: Notice.

The Food Controller hereby directs that the area to which the above Order applies shall, as from the 25th February, 1918, include the following counties: Cornwall, Devon, Dorset, Gloucester, Hampshire, Somerset, and Wiltshire, in addition to the counties mentioned in the Schedule to the Order.

AN Order (No. 211), dated the 21st February, 1918, has been made by the Food Controller to the effect that:—

The Potatoes (Protection) Order, 1918.

1. Every person who is the owner of potatoes, or who has potatoes in his possession or under his control, or under the control of his employees or servants shall, at all times, take or cause to be taken all reasonable precautions to protect such potatoes from frost, damp or other damage, whether such potatoes are growing or are in transit, or are in store or otherwise.

2. In particular, any person who consigns potatoes for transport by railway in open trucks, either on his own behalf or on behalf of any other person, during the months of December, January, February, March and April, shall take or cause to be taken all necessary steps, whether by strawing the trucks into which such potatoes are loaded or otherwise, to protect such potatoes from frost, damp or other damage.

Area Live Stock Commissioners of Great Britain—THE following is a list of the Live Stock Commissioner Areas of Great Britain:—

Area	Live Stock Commissioners	Address	Counties.	Telephone Numbers
		ENGLAND AND	WALES.	
1. N. ..	E Davidson	22, Eslington Terrace, Newcastle-on-Tyne	North'berland, Durham.	191 Jesmond
2. N.E. ..	Major H. J. Daltry.	Cavendish Chambers, 28*a*, Guildford St., Leeds	Yorks (all Ridings)	4348 Leeds.
3. N.W.	T. Brown ..	The Mansion House, Bishops Yard, Penrith	Westmorland, Cumberland.	113 Penrith.
4. N.W.M.	H. Swetenham	20, Liverpool Road, Chester	Lancs, Cheshire, Isle of Man	496 Chester.
5 N.E.M	F. W. Wright	49, Friar Gate. Derby	Notts, Derby, Lincs, Rutland, Leicester, Northants, Soke of Peterborough.	1366 Derby.
6. S.M. ..	H. P. Raikes	51, Newhall St., Birmingham.	Staffs, Salop, Warwick, Worcester, Hereford	2001 Central.
7. North Wales.	D. H. Mac Nicoll	Herman's House, Penryn Road, Colwyn Bay.	Anglesey, Carnarvon, Merioneth, Flint, Denbigh, Montgomery.	49 Colwyn Bay.
8. South Wales.	Col. F. D. Williams Drummond.	Napier House, 14, Spilman St. Carmarthen.	Radnor, Brecknock, Mon., Glam., Carmarthen, Pembroke, Cardigan.	43 Carmarthen.

Area.	Live Stock Commissioners.	Address.	Counties.	Telephone Numbers.
	ENGLAND	AND WALES—*continued.*		
9. E. ..	R. Meade ..	12, Scroope Terrace, Cambridge.	Cambs, Beds, Hunts, Norfolk, Suffolk	251 Cambridge.
10. North London.	H.R C Rigby-Kewley.	Buchanan Buildings, Holborn.	Essex, Herts, Middlesex, Bucks.	3766 London Wall.
11. S E. London.	A S Parfitt	Buchanan Buildings, Holborn.	Surrey, Kent, Sussex.	7168 Victoria.
12 S. ..	J Orr ..	Norham Hall, Oxford.	Hants, Oxford, Berks, Wilts, Isle of Wight, Channel Isles	146 Oxford.
13 S W.	Lieut.-Col C Riddick	2. Higher Somerlands, Exeter.	Cornwall, Devon, Somerset, Dorset, Glos, Scilly Isles, Lundy.	819 Exeter.
		SCOTLAND.		
Commissioner for Scotland	A. P. McDougall	Windsor Hotel, St Vincent St, Glasgow.	——	1970, 1971 Central.
1. N ..	J D. Cameron	9, Ardross Terrace, Inverness	Inverness, Ross, Sutherland, Caithness, Nairn	209 Inverness.
2. N E ..	Thos Yool ..	3, Golden Sq, Aberdeen.	Elgin, Banff, Aberdeen, Kincardine, Orkney, Shetland.	2030 Aberdeen.
3 M ..	J. Lennox ..	44, Tay Street, Perth.	Perth, Forfar, Fife, Clackmannan, Kinross, Stirling.	295 Perth.
4. S.E. ..	C Ritchie ..	Balmoral Hotel. Edinburgh	Linlithgow, Midlothian, Eastlothian, Roxburgh, Berwick, Selkirk, Peebles	9040 Ex 15
5. W ..	J Spier ..	10, Blythswood Sq, Glasgow.	Lanark, Renfrew, Dunbarton, Argyle, Bute	311 Douglas.
6. S W.	J. Picken ..	4, Loroburn Pk, Dumfries	Wigtown, Kirkcudbright, Dumfries, Ayr.	68 Dumfries.

Note—Telegraphic Addresses all PROVINCIAL OFFICES, "Livestodis"

LONDON OFFICES.

Headquarters: "Livestomin, London."

10 North London, H. R. C. Rigby-Kewley: "Livestosal, London."

11 S E. London, A. S Parfitt: "Livestobro—Smith, London"

THE following Order, (No. 247), dated 2nd March, 1918, has been made by the Food Controller, in amendment of the Meat (Maximum Prices) Order, 1917.

The Meat (Maximum Prices) Amendment Order, 1918.

1. The Schedule to this Order shall as from 4th March, 1918, be substituted for the present Schedule to the Principal Order, which shall as from that date be construed as if it had originally been made with such substitution.

2. The general licences issued under the Principal Order dated 24th October, 1917, and 14th January, 1918, are hereby revoked.

Schedule of Maximum Wholesale Meat Prices.

Beef and Veal. Price per Stone.			Mutton and Lamb. Price per Stone.	Pork. Price per Stone.
Home Killed.	Imported.		Home Killed and Imported.	Home Killed and Imported.
Carcase.	Hind Qtrs	Fore Qtrs.	Carcase.	Carcase.
s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*
8 2	8 10	7 6	8 8	9 6

Note.—In ascertaining weights the offals are to be excluded.

In the case of pork other than imported pork, the maximum rate of 9*s.* 6*d* per stone is applicable if the offals are not included in the sale, and the maximum rate shall be 6*d.* higher if the offals are included in the sale. In each case the weight of the offals shall be excluded in ascertaining the weight of the carcase.

AN Order (No. 196), dated 12th February, 1918, made by the Food Controller, contains the following main provisions:—

The Meat (Licensing of Wholesale Dealers) Order, 1918.

1. A person shall not deal in dead meat by wholesale either on his own account or for the account of any other person:—

(*a*) After the 15th March, 1918, unless he has applied for a licence as a wholesale dealer in dead meat; or

(*b*) After the 31st March, 1918, unless he is the holder of a licence for the time being in force granted by the Food Controller authorising him to deal in dead meat by wholesale.

2. Every application for a licence shall be made to the Secretary (Meat Section), Ministry of Food, Palace Chambers, Whitehall, S.W. 1, on a form to be prescribed by the Food Controller, and every applicant shall furnish on such form a true statement of the particulars required for completing the same, which statement shall be signed by the applicant or by his duly authorised agent.

The Order also deals with the issue and revocation of licences, keeping of records and authority for their inspection, the production of licences, etc.

THE Food Controller has, by an Order (No. 173), dated the 7th February, 1918, ordered that, subject to certain provisos :—

The Cattle Feeding Stuffs (Maximum Prices) Order, 1918.

(*a*) No cattle feeding stuffs of any of the varieties specified in the Schedule to this Order shall, after the date when this Order comes into force, be sold at a price exceeding the maximum price applicable thereto according to such Schedule, or such other maximum price as may from time to time be prescribed by the Food Controller.

(*b*) No meal produced by grinding a cake of a variety specified in the Schedule to this Order shall, after the date when this Order comes into force, be sold at a price exceeding the maximum price applicable to such cake according to such Schedule, by more than 15*s*. per ton, or such other sum as may, either generally or in any particular case or class of cases, from time to time be prescribed by the Food Controller.

(*c*) No specially prepared calf meal, pig meal, or lamb food, or other specially prepared food for cattle not being of a variety specified in the Schedule to this Order, shall, after the date when this Order comes into force, be sold at a price exceeding by more than 30*s*. per ton, or such other amount as may from time to time be prescribed by the Food Controller, the total of the cost to the maker of the ingredients used as delivered at his factory and of the cost of manufacture.

The Order also regulates dealers' commissions, transport charges, charges for bags, additions for kibbling, small sales, etc., and places restrictions on the sale of linseed cake, and the use of seeds and compound cakes and meals. The Order is divided into two parts (1) Maximum Prices, and (2) Miscellaneous, and altogether contains 23 provisions

SCHEDULE TO THE ORDER.

	Maximum	*Prices.*		
Home Manufactured Cakes and Meals.	£	*s.*	*d.*	
Linseed Cake containing not less than 8 per cent. oil	19	0	0	per ton.
Cotton Seed Cake	14	10	0	,,
Undecorticated Ground Nut Cake	17	5	0	,,
Semi-decorticated Ground Nut Cake	18	2	6	,,
Decorticated Ground Nut Cake	19	0	0	,,
Palm Kernel Cake	13	15	0	,,
Rape Cake	14	0	0	,,
Copra Cake	16	5	0	,,
Sesame Cake	18	10	0	,,
Soya Cake	19	0	0	,,
Extracted Palm Kernel Meal	13	10	0	,,
,, Rape Meal	14	0	0	,,
,, Soya Meal	18	15	0	,,
Imported Cakes and Meals.				
North American Linseed Cake	19	5	0	,,
Argentine Linseed Cake	19	15	0	,,
Canadian ,, ...	19	10	0	,,
Australian ,, ...	19	10	0	,,

	Maximum	*Prices.*		
	£	s.	d.	
Spanish and Portuguese Linseed Cake	19	10	0	per ton.
Egyptian Cotton Seed Cake	15	0	0	„
Decorticated Cotton Seed Meal	19	15	0	„
„ „ Cake	19	15	0	„
Repressed Cotton Cake	20	15	0	„
Semi-decorticated Cotton Cake	17	10	0	„
Copra Cake	17	10	0	„
Palm Kernel Cake	15	0	0	„
Rangoon Rice Meal	16	10	0	„
Italian Rice Meal	14	10	0	„
Canadian Rice Meal	17	0	0	„
Egyptian Rice Meal	17	0	0	„
Gluten Feed	17	5	0	„
Maize Meal Cake	17	5	0	„
Compound Cakes and Meals (made from two or more ingredients when no oil is expressed in the process of manufacture)				
Cakes and Meals containing not less than 7 per cent oil, and not less than 20 per cent. albuminoids	17	5	0	„
Cakes and Meals containing not less than 6 per cent oil, and not less than 20 per cent albuminoids	17	0	0	„
Cakes and Meals containing not less than 6 per cent oil, and not less than 17 per cent albuminoids	16	17	6	„
Millers' Offals				
Flour Millers' Offals of all kinds	13	0	0	„
Fine Barley Dust	17	0	0	„
Coarse „	8	0	0	„
Oat Dust	6	0	0	„
„ Husks	3	0	0	„
„ Husk Meal	5	0	0	„
Miscellaneous				
Malt Culms	13	5	0	„
Kiln Dust	11	0	0	„
Dried Distillers' Grains	15	5	0	„
„ Brewers' Ale Grains	14	5	0	„
„ „ Porter and Mixed Grains	14	0	0	„
Wet Brewers' Ale and Distillers' Grains for October–April delivery	0	8	4	per usual trade qr.
Wet Brewers' Porter and Mixed Grains for October–April delivery	0	7	10	„
Wet Brewers' Ale and Distillers' Grains for May–September delivery	0	7	4	„
Wet Brewers' Porter and Mixed Grains for May–September delivery	0	6	10	„

Farm Machinery: An Official Appeal to Farmers.

IN view of the increased demand for agricultural machinery the Food Production Department appeals to farmers who have an adequate supply of implements (especially corn drills) to lend or hire their implements to other farmers as soon as they have done their own work. It is difficult to obtain the necessary number of new implements for the whole country, and it is hoped that farmers having any that are surplus to their requirements will either adopt the course outlined above or arrange for the sale of any implements they do not require or which they have replaced by newer ones.

Feeding of Town Horses.

IN view of the increasing shortage of oats and other feeding stuffs, the Controller of Horse Transport appeals to all owners of working horses to exercise every possible economy both in the use of their horses and in the feeding of them The maximum cereal rations allowed under the present Order will shortly have to be further reduced, and it is therefore necessary that the work of horses should be adjusted to the amount they are able to perform without unduly affecting their condition or causing suffering. Loads should be carefully adjusted to the capacity of the horses hauling them, and carmen and others should be warned against over-driving. Wherever possible, substitutes for oats and other cereal foods should be used, and it may be mentioned that in certain parts of the country there are at the present time considerable quantities of carrots available at a reasonable price which could be used as a partial diet for horses not doing the hardest work

The Waste of Foodstuffs Order, 1918

AN Order (No. 212), dated the 21st February, 1918, has been made by the Food Controller to the effect that .—

1. A person shall not waste any foodstuff or cause or permit any foodstuff to be wasted.

2 For the purpose of this Order foodstuff is wasted—(*a*) Whenever the foodstuff, being fit for use in human food, is wilfully or negligently damaged or is thrown away; or

(*b*) whenever any person having the control or custody of the foodstuff omits to take any precaution which ought reasonably to be taken for its preservation ; or

(*c*) whenever a person procures for any purpose a greater quantity of foodstuff than is reasonably required for such purpose, and any part of such foodstuff becomes unfit for human food ; or

(*d*) whenever any person having the disposal of the foodstuff unreasonably retains the same undisposed of until the same becomes unfit for human food.

3. For the purposes of this Order every person having control of the foodstuff in any house, shop, warehouse, or other place in which any foodstuff is wasted by the act or default of any person employed in or about the house, shop, warehouse, or other place shall be deemed to have caused such waste, unless he shall have taken reasonable steps to prevent such waste.

4. A trader shall not be deemed to have caused waste of any foodstuffs obtained for the purpose of his business which becomes unfit for human food without any want of due care on the part of himself, his servants or agents, if it is proved that he has been ready and willing at all times to sell such foodstuffs at reasonable prices, and that he could not reasonably have made such foodstuffs available for human food otherwise than by way of sale in his business.

5. Any person specially authorised in writing by the Food Controller may enter upon any premises in which he has reason to believe that any foodstuff is being wasted, and carry out such inspection and examination of the premises and take such samples as he shall think fit.

6. For the purpose of this Order :—

The expression "foodstuff" shall mean any article which is used for food by man, or which ordinarily enters into the composition or preparation of human food.

MR. PROTHERO, M P., President of the Board of Agriculture, says in reply to a Petition presented by Mr. E. Jardine, M.P., on behalf of poultry-keepers .—

Shortage of Cattle Food: An Official Statement.

"At the beginning of the year a careful estimate was made of the amount of concentrated food for live stock of all kinds that we have or shall have in the country between now and the next harvest. This stock-taking includes the oil cakes existing and likely to be made within the period, the oats, tail corn and damaged grain in farmers' hands, the millers' offals that we may expect, the imported grain materials that will have to be rejected as unfit for human consumption—in fact all the larger items of food for live stock which can be brought under Government control. The account revealed an alarming deficiency, and the Board of Agriculture, with the Ministry of Food, had to consider what classes of animals should be served first. It was found that after the working horses on the farms, in the pits, and in the towns had been provided with a bare ration, and when the milch cows had been given sufficient to carry them on until they could maintain themselves upon the grass there was but a small margin left. That margin has been divided between pigs and poultry. Nothing at all has been allotted to fattening cattle or sheep.

That is the situation. There is not enough food to carry on the business of poultry-keepers or any other class of live stock keepers in the ordinary way Nothing that the Board of Agriculture can do will remove the shortage, or create food where it does not exist. The reason that even the allocation of 1 oz. a day per hen bird, together with a reservation of chick food for utility poultry birds, has been allowed to poultry, is that poultry can to a large extent be fed upon waste materials from the household and the farm by people who are suitably circumstanced, if they are provided with just that minimum of concentrated food which they need to carry poultry through the critical period when they are chicks, and to supplement the waste food at other periods.

If poultry-keepers will lay themselves out to produce eggs under these conditions, and exercise their ingenuity to make use of every sort of food they can get at, except those I have mentioned above, the Board of Agriculture wishes to see every possible fowl kept; but they are unable to accept the suggestion contained in the Petition, that poultry-keepers should be supplied with food in the usual way, for the simple reason that it is not there to give them. When your Petitioners state that 4-lb. weight of poultry flesh can be produced in 16 weeks they omit to set down the other side of the sum, namely the quantity of grain which is consumed in producing this poultry flesh. In so far as the poultry-keepers of the country can make this flesh out of waste, together with the damaged grain, screenings and the like, which has been promised to them, no one is more anxious than myself for their success, but I cannot encourage them for a moment to suppose that they can be allowed sound grain or any of the other materials utilisable for human food, or even that they can be permitted to trench upon the stock that is required for the working horses and the milch cows."

THE following Notice was issued by the Board on the 11th March, 1918.—

Advisory Committee on Pig-keeping.

With the view of promoting the extension of pig-keeping the President of the Board of Agriculture and Fisheries has appointed E. H. Cautley, Esq., M P., Director of Pig Production, with Sir Richard Cooper, Bart , H. R. Beeton, Esq., E. Wherry, Esq., L. C. Paget, Esq., C. F. Marriner, Esq , T. A. Chettle, Esq , and J. Parr, Esq , of the National Pig Breeders' Association as his Advisory Committee.

THE following Letter (No. 12/H.), dated the 6th March, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board —

Pig-keeping for Cottagers and Small Holders.

SIR,—It is urgently necessary to increase the stock of pigs in the country by encouraging to the greatest possible extent the keeping of pigs by cottagers, allotment holders, and private individuals as well as by farmers.

At the instance of the Board of Agriculture, the Ministry of Food is about to issue an Order allocating a ration of cake or offal for the feeding of breeding sows and young pigs. This information should be brought at once to the notice of all pig-keepers so that in their own interests as well as in the national interest they may be encouraged *to keep and breed from all their breeding stock and thereby provide young pigs for keeping by cottagers and allotment holders.*

Instructions on the subject of the feeding of pigs with the foods which are avilable are about to be issued, and I shall be obliged if you will let me know the number of copies of these instructions which can be made use of for propaganda purposes in your county.

In the meantime I trust that you will use every effort to make known as widely as possible the need for increasing the number of pigs and the fact that, in spite of the shortage of concentrated foods, feeding stuffs will be avilable for pig-keeping.

I am, etc.,
(Signed) FREDERICK KEEBLE,
Director of Horticulture.

AN Order (No. 224), dated 26th February, 1918, has been made by the Food Controller to the effect that:—

The Barley (Requisition) Order, 1918.

1. All persons who, on the 1st March, 1918, own or have power to sell or dispose of any barley, whether home-grown barley in its natural condition, or home-grown barley which has been treated or kiln-dried, or barley which has been imported, shall place such barley at the disposal of the Food Controller, and shall deliver the same to him or such persons as may be named by him in such quantities and at such time as the Food Controller may from time to time direct.

2. Pending any direction no person shall, on or after the 1st March, 1918, remove or otherwise dispose of any such barley (whether in pursuance of a contract existing at the date of the Order or not), and all persons concerned shall take such steps as may be reasonably necessary to maintain the same in good condition.

3. All persons who, on the 1st March, 1918, own or have power to sell or dispose of any such barley shall, on or before 7th March, 1918, furnish to the Secretary (Home Cereals Section), Ministry of Food, Palace Chambers, Westminster, London, S.W 1, a statement on forms to be obtained from the Food Controller, giving particulars of all such barley in their possession or under their control at the date of this Order, and of all contracts made by them before the 1st March, 1918, for the sale of such barley, and of such other matters as are necessary to complete the forms.

4. The Food Controller will subsequently communicate to the owners of barley taken over by him the prices which he will be prepared to pay for the same.

5. The compensation to be paid for barley requisitioned under this Order shall, in default of agreement, be determined by the arbitration of a judge of the High Court selected by the Lord Chancellor of Great Britain in England, of a judge of the Court of Session selected by the Lord President of the Court of Session in Scotland, or of a judge of the High Court of Ireland selected by the Lord Chief Justice of Ireland in Ireland.

6. This Order shall not apply—

(*a*) to persons who do not own more than 25 qr. (448 lbs. per qr.) of barley on the 1st March, 1918;

(*b*) to barley owned by the grower on the 1st March, 1918;

(*c*) to barley in the hands of or held to the order of flour millers on the 1st March, 1918;

(*d*) to barley agreed to be sold to the Royal Commission on Wheat Supplies;

(*e*) to barley which is both suitable for and has been bought specifically for the purpose of seed.

AN Order (No. 210), dated the 19th February, 1918, made by the Food Controller, contains the following main provisions:—

The Oats Products (Retail Prices) Order, 1918.

1. No person shall on or after the 21st February, 1918, sell or offer or expose for sale, or buy or offer to buy by retail any oat flour, oatmeal, rolled oats, flaked oats, or other like products of oats at prices exceeding the maximum prices applicable thereto according to the following table:—

Place of Sale.	Oat Flour.		Oatmeal, Rolled Oats, Flaked Oats, or other like Products of Oats.	
	For every 7 lb. included in the Sale.	Rate per lb. for any quantity less than 7 lb. included in the Sale.	For every 7 lb. included in the Sale.	Rate per lb. for any quantity less than 7 lb. included in the Sale.
	s. *d.*	*d.*	*s.* *d.*	*d.*
England and Wales..	2 10	5	2 6½	4½
Scotland and Ireland	2 6½	4½	2 3½	4

Provided that, as respects sales taking place in any part of Scotland other than the mainland, the Food Commissioner for that division in which such sale takes place may authorise the addition of such sum as he thinks reasonable not exceeding a sum at the rate of ½*d.* per lb.

2. The maximum price shall include all charges for bags and other packages, and no additional charge shall be made therefor. No extra charge may be made for giving credit or for making delivery.

The previous Order (No. 1157, 1917*), as subsequently amended, is, by this Order, revoked.

The Oatmeal (Restriction) Order, 1918.

AN Order (No 166), dated the 7th February, 1918, has been made by the Food Controller to the effect that:—

1. No person shall on or after the 10th day of February, 1918, use any oatmeal, oat flour, groats, rolled oats, or flaked oats, except in the manufacture of articles suitable for human food, or use any article containing or manufactured from any oatmeal, oat flour, groats, rolled oats, or flaked oats, except as human food.

2. This Order shall not apply to any oatmeal, oat flour, groats, rolled oats, or flaked oats which on the 10th day of February, 1918, had been so treated as to be unfit for human food, or to any oatmeal, oat flour, groats, rolled oats, or flaked oats, or to any articles containing or manufactured from them which are or may become unfit for human food.

The Order contains certain other provisions as to damaging oatmeal taking of samples, determination of questions, etc.

New Prices for Cheese.

THE Ministry of Food is now able to assure makers of British cheese that the maximum prices fixed for certain cheeses *ex* farm or factory will not be less in the months indicated than those stated below:—

1. For British cheese exceeding 2 lb. in weight, other than Caerphilly, made in 1918 from whole milk, and sold by the producer within the months of April and May, the maximum price for best quality shall not be less than .. .. .. 1*s.* 6*d.* per lb.

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* See this *Journal*, December, 1917, p. 1013.

2. Ditto for Caerphilly .. .. 1*s*. 4½*d*. per lb.

3. For British cheese exceeding 2 lb. in weight, other than Caerphilly and ripened Stilton and Wensleydale, made in 1918 from whole milk, and sold by the producer within the months of June to October inclusive, the maximum price for best quality shall not be less than.. 1*s*. 3½*d*. ,,

4. For British-made Caerphilly cheese, the produce of whole milk, made in 1918, and sold by the producer within the months of June to October inclusive, the maximum price for best quality shall not be less than.. 1*s*. 2*d*. ,,

The price of ripened Stilton and Wensleydale will be dealt with later. (*National Food Journal*, 27th February, 1918.)

THE Food Controller, by an Order (No. 161), dated the 7th February, 1918, has made the following amendment to the Principal Order (No. 24), 1918 :—*

The Milk (Registration of Dealers) Postponement Order, 1918.

In Clause 1 (*a*) of the Principal Order "the 16th February, 1918," shall be substituted for "the 9th February, 1918," and in Clauses 1 (*b*), 6 (*a*), and 6 (*b*), respectively, of the Principal Order "the 2nd March, 1918," shall be substituted for "the 23rd February, 1918."

BY an Order (No. 200), dated the 15th February, 1918, the Food Controller has prohibited, except under licence, any person to—

The Egg (Restriction) Order, 1918.

(*a*) Use any eggs or any egg products for any purpose other than human consumption or in the manufacture of articles for human consumption ; or

(*b*) Sell or buy or offer to sell or buy any eggs or any such products except for human consumption or the manufacture of such articles ; or

(*c*) Damage or waste or permit to be damaged or wasted or otherwise treat or permit to be treated any egg or egg products so as to render the same less fit for human consumption or for the manufacture of such articles.

Certain exceptions in regard to eggs for breeding purposes and unfit for human consumption are made in the Order.

THE following Notice, dated 19th February, 1918, has been issued by the Board :—

Petroleum and Paraffin for Poultry Keepers.

At the request of the Poultry Advisory Committee the Board of Agriculture have approached the Pool Board (Petroleum Supplies) with a view to enable poultrymen to obtain supplies of paraffin for artificial incubation and rearing.

The Pool Board have agreed to allow poultrymen to obtain paraffin who can satisfy the secretary of a poultry club, a poultry society, or a co-operative agricultural society that they intend to use any paraffin they may obtain solely for artificial incubation and rearing, and also that the amount asked for is reasonable.

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* See this *Journal*, February, 1918, p. 1301.

On being satisfied that an application is *bonâ fide*, the secretary of the club or society should give the applicant a letter stating that he is so satisfied. The applicant should then take the letter to the oil retailer with whom he usually deals, who will then be able to obtain the oil from the distributing agent for his district.

In remote districts where it is difficult or impossible to obtain letters from secretaries of societies, applicants for oil must satisfy their usual oil retailers that the oil they ask for will be used for incubation or hatching.

The Board of Agriculture have been unable to communicate with the individual secretaries of the poultry and other clubs and societies referred to. The Board is, however, confident that they may rely on the loyal co-operation and assistance of these gentlemen in the scheme explained above.

THE following Notice, dated 22nd February, 1918, has been issued by the Board :—

Sittings of Eggs for Utility Breeds of Poultry.

The Board of Agriculture and Fisheries have now completed arrangements for the distribution of sittings of eggs of selected breeds of utility poultry through approved station-holders in many of the counties of England and Wales. The Board have decided to continue this scheme in spite of the scarcity of food and the reduction of bird stocks that is likely to follow, because they have felt that present circumstances render it more than ever desirable that every possible step should be taken to effect an improvement in the quality of poultry. It is to be understood, however, that no one should apply for eggs under the scheme who cannot see his way to rear the produce of the sittings on the basis that the supply of purchased food may be restricted to a maximum of one ounce per bird per day for selected birds.

THE following Order, dated the 15th February, 1918, has been made by the Minister of Munitions :—

The Copper Sulphate Order, 1918.

1. For the purposes of this Order the maximum prices for sulphate of copper shall be as follows :—

(*a*) In the case of sales for delivery free on rail, cart, barge or ship at maker's works or nearest siding or railway station, or nearest available wharf, the prices specified in the first schedule hereto according to the date on which, under the terms of the contract for sale, delivery is to be made.

(*b*) In the case of sales for delivery to consumer's premises or nearest station, siding, or wharf, direct from maker's works, the maximum prices under paragraph (*a*) above, plus all costs of transport from maker's works to place of delivery, excepting that where transport is partly by rail or water, no charge is to be made for cost of cartage or haulage by road from maker's works to railway station, siding, or wharf. Any cartage or haulage to consumer's premises to be charged at local rates.

(*c*) In the case of sales for delivery *ex* vendor's store or shop, or *ex* warehouse, railway goods yard or public wharf, the prices specified in the Second Schedule* hereto according to the quantity of sulphate of copper included in the sale and the date on which, under the terms of the contract of sale, delivery is to be made.

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* The prices specified in the First and Second Schedules are set out in the Memorandum printed below.

(*d*) In the case of sales for delivery to consumer's premises from vendor's store or shop, or from warehouse, railway goods yard or public wharf, the maximum prices authorised under paragraph (*c*) above, plus all costs of transport from vendor's store or shop, or from warehouse, railway goods yard or public wharf to consumer's premises any cartage or haulage by road to be charged at local rates.

2. The maximum prices fixed by this Order are net prompt cash prices for sulphate of copper in maker's or vendor's bags. Where credit is given to the purchaser a reasonable extra charge may be made, provided that the discount allowed for net prompt cash is quoted on the invoice and is such as to bring the net prompt cash price within the maximum authorised. If purchaser's bags or other packages are used a reasonable allowance shall be made.

3. The maximum prices fixed by paragraphs (*a*) and (*b*) of Clause 1 of this Order shall not apply to any sale by a maker for delivery as mentioned in those paragraphs where the quantity of sulphate of copper included in the sale is less than 1 ton; and none of the provisions of this Order shall apply to any sale of sulphate of copper for export from the United Kingdom. Save as aforesaid, no person shall, as on and from the day following the date of this Order until further notice, effect or offer to effect any sale or purchase of sulphate of copper for delivery previously to the 1st September, 1918, at a price exceeding that prescribed by this Order as the maximum price (having regard to the quantity, packages, date for and terms of delivery) for such sale.

4. The maximum prices fixed by this Order are for sulphate of copper of standard quality, *i.e.*, of not less than 98 per cent. purity, and as on and from the day following the date of this Order no person shall effect or offer to effect any sale or purchase of sulphate of copper of less than standard quality for delivery previously to the 1st September, 1918, except under and in accordance with the terms and provisions as to price or otherwise of a licence issued by or under the authority of the Minister of Munitions.

5. All persons engaged in producing, making, selling, distributing, or storing sulphate of copper shall make such returns with regard to their businesses, and shall verify the same in such manner (including production of their books to any accredited representatives of the Minister of Munitions) as shall from time to time be required by or under the authority of the Minister of Munitions.

6. For the purposes of this Order and the Schedules hereto, sulphate of copper shall mean and include sulphate of copper, blue stone, and blue vitriol.

7. Nothing contained in this Order shall affect any Order heretofore or hereafter made by the Minister of Munitions with regard to copper.

8. This Order may be cited as the Copper Sulphate Order, 1918.

NOTE.—All applications in reference to this Order should be addressed to the Director of Acid Supplies, Ministry of Munitions, Department of Explosives Supply, Storey's Gate, Westminster, S.W. 1, and marked "Copper Sulphate."

THE following Notice has been issued by the Food Production Department of the Board :—

Prices of Copper Sulphate for Potato Spraying.

Maximum prices have now been fixed for sulphate of copper for agricultural purposes. Farmers and potato growers are urged by the Food Production Department to place orders for this material with their usual merchants or dealers without delay and to take delivery as soon as possible. The prices are based on a sliding scale, and deliveries early in the season will be made at a lower price.

The price for sales of quantities of not less than 1 ton by makers f.o.r. at works is £48 per ton January–February delivery ; £50 per ton March–April delivery ; £52 per ton May–August delivery.

The prices for sales by merchants, dealers, chemists and others *ex* store, shop or warehouse, are as follows :—

Quantity Included in Sale.	*Date for Delivery.*		
	Jan.–Feb.	*Mar.–Apl.*	*May–Aug. Inclusive.*
2 cwt. and over	54*s.*	55*s.*	56*s.* per cwt.
56 lb but less than 2 cwt. ..	56*s.*	57*s.*	58*s.* ,, ,,
28 ,, ,, 56 lb. ..	58*s.*	59*s.*	60*s.* ,, ,,
8 ,, ,, 28 ,, ..	6½*d.*	7*d*	7*d.* ,, lb.
4 ,, ,, 8 ,, ..	7*d.*	7½*d.*	8*d.* ,, ,,
1 ,, ,, 4 ,, ..	8*d.*	8½*d*	9*d.* ,, ,,

A Circular setting out the terms of the Order in more detail can be obtained from the Food Production Department, 72, Victoria Street, London, S.W. 1.

Diseases of Animals Acts: Suspension of Article 2.

THE Board desire to give notice that the operation of Article 2 (*Prohibition of bringing Cattle, Sheep, Goats, or Swine from Scheduled Country into a Port in Great Britain*) of the Foreign Animals Order of 1910, and any provision amending that Article is by an Order (No. 9907), dated the 18th December, 1917, suspended until such date as the Board shall by Order direct ;

Provided that such suspension shall not affect the previous operation of the said Article or any licence granted thereunder or any penalty or punishment incurred in respect of any offence committed against the said Article before the date hereof.

Glass Jars for Preserving.

ALL who have not already obtained a sufficient stock of glass jars for preserving fruit and vegetables during the coming season are advised by the Food Production Department to place their orders with local retailers without delay. If the orders are deferred, the jars may be difficult to obtain, and the prices which will have to be paid may be higher than they are at present.

It may be recalled that it was stated in this *Journal* for January last (p. 1124) that in conjunction with the Ministry of Munitions, and after conference with representatives of the manufacturing, wholesale and retail organisations, arrangements had been made for the supply of glass jars of the screw top, rubber ring type, at the following maximum prices :—

5*s*. 9*d*. per dozen for 2-lb. jars in not less than 20-gross lots, when purchased co-operatively by societies and when the purchasing society accepts delivery at the railway station and undertakes distribution.

6*s*. 3*d*. per dozen for 2-lb. jars, in not less than 20-gross lots, when distribution is undertaken by the retailer to the members of the society or organisation placing the order.

For small quantities the maximum prices per dozen are:—

6*s*. 6*d*. per dozen for 1-lb. jars.
7*s*. 6*d*. „ „ 2-lb. „
10*s*. 0*d*. „ „ 3-lb. „
11*s*. 6*d*. „ „ 4-lb. „

In making this announcement, the Food Production Department pointed out that this arrangement does not necessarily apply to orders placed after the 31st March, inasmuch as after that date makers may find themselves obliged to increase the prices.

Experimental Production of Sugar from Beets.

IT was announced in the House of Commons on 20th February that the Board of Agriculture are amply satisfied that the growth of sugar beet of good quality is possible in this country. In order to ascertain the commercial results of the manufacture of sugar from sugar beet under English conditions the Government has provided funds for the acquisition of an estate in Notts, through the British Sugar Beet Growers' Society, which estate will provide a site for the factory and grow a proportion of the beet required. The Board of Agriculture have made themselves responsible for the cultivation of this estate. Full possession will not be obtained before April, but the work of cleaning and preparing the land for intensive cultivation has already been begun. So far as the Board are aware, no other undertaking of the kind is in prospect. The beet-sugar factory at Cantley has been closed during the War. Whether a factory can be erected on the Kelham estate during the War is doubtful, in view of the position with regard to man-power and machinery, but a stock of seed is being procured from which to grow the seed that will be required whenever the factory can start operations.

Meeting of Agricultural Wages Board.

THE fourth meeting of the Agricultural Wages Board was held at 80, Pall Mall, London, S.W. 1, on the 28th February, 1918, Sir Ailwyn Fellowes presiding.

The Selection Committee appointed to consider the names of persons suggested as suitable representatives of employers and workers, respectively, for District Wages Committees presented recommendations in regard to the District Committees for (1) Suffolk; (2) Essex; (3) Northumberland and Durham; (4) Buckinghamshire; (5) Warwickshire; (6) Cambridgeshire (including Isle of Ely), Huntingdonshire and Bedfordshire. The recommendations of the Selection Committee were approved and, with the addition of the impartial members appointed in each case by the Board of Agriculture and Fisheries, District Committees were formally established for these districts.

The attention of the Board was drawn to the difficulties experienced under present conditions by the wives of agricultural labourers in making their purchases of food, owing to wages in some cases not being paid until Saturdays. The Board unanimously agreed to put on record and to give publicity through the Press to their opinion that it is very desirable that the payment of weekly wages to agricultural workers should be made not later in the week than Friday, as is already customary with many farmers.

THE following Letter (No. 82/L. 3), dated the 4th March, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Minimum Wage for Women's Land Army.

SIR,—I am directed to inform you that the Department has decided that the minimum wage for women enrolled in the Land Army, shall be increased from 18*s*. to 20*s*. a week. Women accepted as members of the Land Army, shall not, after 1st March next receive a lesser wage than 20*s*., while those who have passed an efficiency test, to include a month's satisfactory work on a farm after the training period, shall receive a wage of 22*s*. and upwards.

The Department will be glad if you will bring this information to the notice of the Agricultural Executive Committee and Labour Sub-Committee.

I am, etc.,
(Signed) MERIEL L. TALBOT,
Director, *Women's Branch*.

THE following Memorandum (No. 29/C. 1), dated the 26th February, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Air Raids and Insurance.

Farmers and occupiers of land should be careful to see that their property is insured against damage by aircraft or bombardment.

If any farmer or occupier possesses property of the value of more than £500, no compensation will be paid to him for damage to any part of that property unless he is insured under the Government Aircraft and Bombardment Insurance Scheme, particulars of which can be obtained from any Fire Insurance Company, but he need only insure to the extent by which the value of his property exceeds £500.

For example, if a farmer has property to the value of £1,500 the Government undertake to compensate him for damage provided that he has taken out a policy of insurance against aircraft or bombardment for not less than £1,000. He is treated as if he had been insured for £1,500. If a farmer's property is of less value than £500 he will be compensated for damage without payment of premium or the necessity of taking out a policy of insurance.

It is important to remember that in calculating the value of a farmer's property for the above purpose, the whole of his insurable property in the United Kingdom is taken into account. It includes farm stock, implements and crops, together with his household possessions.

Compensation paid by the Government (whether the property is insured or not) will be limited to the actual damage done, having regard to the condition and value of the property at the time of the damage, and will be devoted to making good the damage.

In the event of damage to property which is partly insured, immediate notice must be given to the Insurance Company. In any other case notice must be given to the Air Raid Compensation Committee, Palmerston House, Old Broad Street, London, E.C. 2.

Cheese Mites: A Correction.

MISS N. B. EALES desires the Board to make the following correction to her article on Cheese Mites which appeared in the issue of this *Journal* for January last (p. 1092, para. 3):—"The common practice of dipping mite-attacked cheeses in hot water or of submitting them to steam heat is, therefore, of no use as a remedy." The word "therefore" should be omitted, since no reference to treatment by hot water or steam heat appears in the preceding paragraph. The experiment has, however, been made and the statement is correct.

Llandudno Allotment District: A Correction.

IN the issue of this *Journal* for February last, p. 1262, it was stated that the Llandudno Urban Council had acquired "compulsorily" a new field for allotments. The Board are asked by Mr. G. A. Humphreys, the agent for Lord Mostyn, the owner of the field concerned, to point out that no compulsory order was ever issued. It appears from the Minutes of the Carnarvonshire War Agricultural Executive Committee that "Mr. G A. Humphreys reported that the Llandudno Urban District Council had come to satisfactory terms with Mr John Owen, Gloddaeth Avenue, for the acquisition of the field in his occupation for allotment purposes." Furthermore, the Food Production Department is informed that Lord Mostyn's agent, who is also a member of the County Agricultural Executive Committee, has taken a keen interest in the allotment movement, and has rendered excellent service in increasing the number of allotments in the Llandudno district.

Prosecutions of Farmers under Statutory Rules and Orders.

EDINBURGH.—Samuel John Robinson, Darnkead Farm, on wholesale milk sales, £100, and Thomas Henry Hood, vanman, £20.

SEVENOAKS.—William Davys, farmer, on sales of milk, £127; and Montague Blake, £50.

COALVILLE.—For killing and selling mutton without a retailer's licence, Frank Stamforth, farmer, Hugglescote, was fined 19 guineas inclusive of costs.

NORTH WALSHAM.—Hubert Pratt, farmer and dealer, was fined £20 for selling a bull and heifer outside a cattle market to Arthur Kett, Hall Road, Norwich; Kett, £30 for buying the beasts for slaughter and selling them; and Ernest Benjamin, Goldhurst Terrace, Hampstead, £40 for buying them for slaughter from Kett. These acts contravened the Cattle Sales Order.

KESTEVEN.—Charles and Sarah Ann Marfleet, owners of coursing greyhounds, Boothby Graffoe, Lincoln, were fined £10 each for feeding six hounds on wheaten bread soaked in milk; Thomas Bailey, farmer, Boothby Graffoe, was fined £50 for feeding barley sheaves to young cattle—a second offence. (*National Food Journal*, 27th February, 1918, and 13th March, 1918.)

New Prices of Pigs.

THE Food Controller, after consultation with the Director of Pig Production, has now fixed the price of pigs at 21*s*. per score live weight, and 28*s*. per score dead weight, and further provided that there should be a free sale in pigs up to a live weight of 80 lb., and has prohibited the slaughter of any pig under 112 lb.

The above conditions have been designed with the view of interfering with the farmer and breeder as little as possible, and with a view to stimulating production.

The national need for more bacon and fats is urgent. It is hoped that the farmers and breeders will recognise this, will realise that the price has been liberally increased to meet the increasing shortage of feeding stuffs, and will at once direct their efforts to increasing the number of their breeding sows and the production of stores.

It is estimated that between now and harvest there will be available sufficient concentrated feeding stuffs to allow of 4 cwt. for each breeding sow and 1½ cwt. for each store after weaning.

The Director is satisfied that the ingenuity and resource of the individual farmer and breeder will find a way of overcoming the food difficulty. He would, however, point out that a new situation requires new methods, and that much extended use must be made of potatoes, mangels, artichokes, parsnips, carrots, roots of all kinds, vetches, lucerne, clover, grasses, acorns, beechmast, chestnuts, house refuse. Meanwhile, in conjunction with the National Salvage Council, he is directing his efforts to the creation of new pig foods out of camp and town refuse and other manufacturing refuse, and also to the establishment and encouragement of pig co-operative societies, pig clubs, the cottager's pig and the private householder's pig; to the distribution of such pig foods as are in the country and a fair allocation of the same by priority certificates.

It is important that the breeder should at once get to work in order to fill the demands of the smaller pig owner and finisher, which he anticipates will arise in every village.

Potato Spraying: The Supply of Soda Crystals.

THE Food Production Department has arranged with the principal manufacturers of soda crystals to supply this product during the ensuing season at £4 7*s*. 6*d*. per ton net in 2 cwt. bags, delivered to any station in England, Scotland and Wales, in 5 ton lots. In large cities and other approved centres, lots of 1 ton and upwards will be supplied at the same price. For lots of less than 1 ton, orders should be placed with local dealers.

The retail price of soda crystals sold from shop or store ought not to exceed the following:—56 lb., 3*s*. 6*d*.; 14 lb., 1*s*.; 7 lb., 6*d*.; and 1 lb., 1*d*.

The demand for soda crystals can only be met by the manufacturers if orders are placed immediately and delivery accepted as and when facilities offer. Horticultural associations, farmers, allotment-holders and others should therefore make arrangements to combine their requirements, and to place orders at once with manufacturers or dealers for lots of 1 ton and upwards, and with dealers or retailers for smaller quantities. If any difficulty occurs in obtaining supplies, a communication should be sent to the Food Production Department, 72, Victoria Street, London, S.W. 1.

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for February, 1918, issued by the International Institute of Agriculture, contains estimates of the production of cereal crops in the Northern Hemisphere. The countries in respect of which it is possible to give forecasts are as follows :—In *Europe*—Denmark, Spain, France, Great Britain, Ireland, Italy, Luxemburg, Norway, Netherlands, Sweden, Switzerland ; in *America*—Canada, United States ; in *Asia*—British India, Japan ; in *Africa*—Algeria, Egypt, Tunis.

Wheat.—The total production in the above-mentioned countries is estimated to amount to 233,320,000 qr. in 1917, against 242, 379,000 qr. in 1916, a decrease of 3·7 per cent., while the area sown was smaller by 5·1 per cent.

Rye.—In the above-mentioned countries in Europe and America, except Great Britain, the yield is placed at 18,704,000 qr. in 1917, against 19,396,000 qr. in 1916, a decrease of 3·6 per cent., but the area sown was larger by 7·1 per cent.

Barley.—The production in the specified countries, excluding British India, is estimated at 73,785,000 qr. in 1917, against 73,122,000 qr. in 1916, or an increase of 0·9 per cent., the area sown being greater by 5·7 per cent.

Oats.—The total yield in the specified countries, with the exception of British India, Japan, and Egypt, is placed at 280,283,000 qr. in 1917, or an increase of 12·4 per cent. compared with 1916, when it amounted to 249,894,000 qr., while the area sown showed an increase of 8·7 per cent.

Maize.—The total production in Spain, Italy, Switzerland, Canada, United States and Japan is estimated to amount to 383,395,000 qr. in 1917, against 315,371,000 qr. in 1916, an increase of 21·6 per cent., the area sown being greater by 12·4 per cent.

France.—According to a report issued by the Ministry of Agriculture, field work and sowing was resumed during the latter half of January, this work having been hindered since the middle of December. Somewhat larger areas have been sown with wheat and winter oats than a year ago. The appearance of the young crops is generally satisfactory. In some parts of the south, considerable areas are being prepared and reserved for potato planting. (*Broomhall's Corn Trade News*, *18th* February, 1918.)

Canada.—According to a report issued by the Census and Statistics Office at Ottawa on the 25th January, the average yields per acre of last year's grain crops were as follows (1916 figures in brackets) :—wheat, 15·75 bush (17·10) ; barley, 23·0 (23·72) ; and oats, 30·25 (37·3). The quality, as indicated by the average weight per bush., is as follows :—wheat, 59·46 lb. (57·10) ; barley, 46·97 lb. (45·66) ; oats 33·55 lb. (33·86) ; and rye 53·44 lb. (54·95).

India.—According to a special forecast the acreage under wheat in India this season is 33,885,000 acres compared with 30,924,000 acres, the first forecast last year. The crop is generally good, except on unirrigated tracts of the Punjaub frontier, and parts of Bihar, Orissa, and Bengal. Damage by frost is reported from the Punjaub and Central Berar. Rain is needed in the wheat-growing areas. (*Broomhall's Corn Trade News*, 23rd February, 1918.)

United States.—According to a report issued on the 8th March by the Statistician of the Department of Agriculture, the estimated stocks of grain in farmers' hands in the United States on the 1st March, 1918, were as follows (stocks on the same date in 1917 in brackets) :—Wheat, 111,000,000 bush. (101,000,000) ; barley, 43,000,000 bush. (33,000,000) ; oats, 595,000,000 bush (394,000,000) ; and maize, 1,293,000,000 bush. (789,000,000). (*Broomhall's Corn Trade News*, 9th March, 1918.)

Japan.—According to reports dated the 10th and 18th of January, received from H.M. Ambassador at Tokyo, the wheat crop for 1917 was an excellent one, the total production being estimated at 4,207,448 qr compared with 3,650,153 qr. in the previous year ; the yield of barley was 5,684,683 qr., compared with 5,909,940 qr. in 1916, and that of rye 5,082,273 qr. compared with 4,910,226 qr. At the date of the report the sowing of this year's wheat crop had just been completed under favourable conditions and the acreage is stated to be further increased. The condition of the young crops of barley and rye is said to be generally satisfactory.

Australia.—According to the official crop statistics for New South Wales the area under wheat in 1916–17 was 3,804,000 acres, and the production 36,598,000 bush., compared with 4,189,000 acres, and 66,765,000 bush. in 1915–16. The number of live stock was as follows :—Horses, 734,000 against 720,000 in the previous year ; cattle, 2,766,000 against 2,406,000 ; sheep, 36,180,000 against 32,601,000 ; and pigs 360,000 against 281,000. (*Broomhall's Corn Trade News*, 23rd February, 1918.)

New Zealand—The area sown with wheat for the 1917–18 season is 293,945 acres, and with oats 484,257 acres, compared with 224,291 and 564,726 acres respectively in 1916–17. (*The London Grain, Seed and Oil Reporter*, 7th March, 1918.)

South Africa.—According to the official bulletin for November, the wheat crop of the Union in 1917, was a record one, and sufficient for the ordinary supply of the country for 8 to 9 months. Oats and barley are also good crops, but potatoes are poor. (*Broomhall's Corn Trade News*, 20th February, 1918.)

Live Stock in the United States.—The numbers of live stock on farms and ranches as estimated by the annual statistics of the 1st January, 1918, are as follows (the numbers on the 1st January, 1917, being shown in brackets) :—horses, 21,563,000 (21,126,000) ; milch cows, 23,284,000 (22,768,000) , other cattle, 43,546,000 (40,849,000) ; sheep, 48,900,000 (48,483,000) , pigs 71,374,000 (67,453,000). (*International Crop Report and Agricultural Statistics*, February, 1918.)

Agricultural Conditions in England and Wales on 1st March.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales during February, state that the autumn-sown wheat is everywhere looking well and promising, especially in the west, where in a few places it is regarded as being almost too forward. Winter oats are generally also a good and promising crop. Beans are rather more variable, the plant being thin in a few districts, but otherwise healthy and satisfactory. The weather during

February was very favourable to field work, having been universally mild and open, though with rather too much rain in some of the northern districts. Ploughing and cultivation accordingly made rapid progress, and much spring wheat was got in under favourable conditions. Wheat sowing is not yet completed, and another 10 per cent. of the total wheat area probably still remains to be sown, but this work is more nearly finished in the east than in the west. In most districts some oats and barley have also been got in, but the seeding of these cereals is generally only just beginning. Spring work is well forward for the time of year.

Seeds are, except in the north-eastern side of the country, where they are often thin owing to the dry summer last year, a good plant, growing well, and giving satisfactory promise A certain area has in most parts of the country been ploughed up for corn, so that it may be expected that the total area under clovers and rotation grasses will be somewhat reduced

Ewes are generally in very good health, although they are nearly everywhere in somewhat thin condition. Prospects for lambing are everywhere regarded as satisfactory In the southern counties the flocks which have lambed have given very good results, with but few exceptions; reports as to number of twins being on the whole above the average. The lambs are generally healthy and growing well, while very little mortality is reported.

Other live stock are generally in fair condition. They are quite healthy, but owing to the shortage of artificial feeding stuffs fattening cattle especially are making only slow progress. The supplies of home-produced winter keep are proving sufficient in the west, although there is considerably less available in the east and some parts of the north, and occasional reports have been received of the poor quality of the hay or straw.

Labour is still very deficient, especially the more skilled. in spite of the assistance of soldiers and women

The following local summaries give further details regarding agricultural labour in the different districts of England and Wales:—

Agricultural Labour in England and Wales during February.

Northumberland, Durham, Cumberland, and Westmorland.—In most parts of Cumberland and Westmorland there is a sufficient supply of labour, but in Northumberland and Durham farmers could do with more workers.

Lancashire and Cheshire.—Labour is nearly everywhere very scarce.

Yorkshire.—In some districts a real shortage in the supply of labour is still being felt, but in most districts the supply is moderately satisfactory

Shropshire and Stafford.—The supply of labour is still short, but not worse than last month.

Derby, Nottingham, Leicester, and Rutland.—The supply of labour is still deficient, especially of skilled men, but soldiers and women are rendering good assistance.

Lincoln and Norfolk.—In most districts the shortage in the supply of labour is not very acute, as soldiers and women have nearly made up for the scarcity of regular workers.

Suffolk, Cambridge, and Huntingdon.—In some districts there has been sufficient labour available during February, but in others there is still a shortage.

Bedford, Northampton, and Warwick.—In some districts the supply of labour is short, but with the assistance of soldiers and women the supply is mostly sufficient for present needs.

Buckingham, Oxford, and Berkshire.—With the help of soldiers and women the supply of labour is better than previously, but more workers are still required.

Worcester, Hereford, and Gloucester.—The supply of labour is short, particularly skilled men, but the assistance of women and soldiers has helped out the shortage.

Cornwall, Devon, and Somerset—The supply of labour is short, and the shortage is expected to be felt more acutely as the season advances. Much help is being given by women and soldiers.

Dorset, Wiltshire, and Hampshire.—Labour is generally short, but up to the present the deficiency has not been felt acutely. Considerable assistance is being given by women and soldiers.

Surrey, Kent, and Sussex.—The supply of labour is short, especially skilled men, but the deficiency has been met to a certain extent by women and soldiers.

Essex, Hertford, and Middlesex.—The supply of labour, though still deficient in most districts, appears to be improving a little.

North Wales.—Casual labour is very scarce, but with the help received from the men released from the Army there is about a sufficient supply for present requirements.

Mid. Wales.—The supply of labour is still short, especially as regards skilled men.

South Wales.—Though the supply of labour is deficient, work is fairly forward, but the shortage will be more keenly felt from now onwards.

THE following statement shows that according to the information in the possession of the Board on 1st March, 1918, certain diseases of animals existed in the countries specified :—

Prevalence of Animal Diseases on the Continent.

Austria (on the 30th January).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of December).—Anthrax, Swine, Erysipelas.

France (for the period 20th January—2nd February).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders, and Farcy, Rabies, Sheep-pox, Sheep-scab, Swine Fever.

Germany (for the period 1st—15th January).—Foot-and-Mouth Disease, Glanders and Farcy, Swine Fever.

Holland (month of January).—Anthrax, Foot-rot, Swine Erysipelas.

Hungary (on the 30th January).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (for the period 28th January—3rd February).—Anthrax, Black-leg, Foot-and-Mouth Disease (1,890 outbreaks), Glanders, Rabies, Sheep-scab, Swine Fever.

Norway (month of January).—Anthrax.

Sweden (month of January).—Anthrax, Swine Fever.

Switzerland (for the period 4th—10th February).—Anthrax, Black-leg, Sheep-scab, Swine Fever.

No further returns have been received in respect of the following countries: Belgium, Bulgaria, Montenegro, Rumania, Russia, Serbia, Spain.

The Weather in England during February.

District.	Temperature. Daily Mean.	Temperature. Diff. from Average.	Rainfall. Amount.		Rainfall. Diff. from Average.	Rainfall. No. of Days with Rain.	Bright Sunshine. Daily Mean.	Bright Sunshine. Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 2nd Feb.:								
England, N.E. ...	77·6	+1·4	0·16	4	— 7	2	2·6	+0·6
England, E.	76·8	0·0	0·07	2	— 9	3	2·8	+0·4
Midland Counties ...	78·0	+1·9	0·17	4	— 9	2	2·6	+0·7
England, S.E. ...	78·2	+1·6	0·08	2	— 11	2	4·6	+2·3
England, N.W. ...	80·5	+5·5	0·17	4	—14	2	3·2	+1·5
England, S.W. ...	80·6	+4·3	0·29	7	—14	2	3·9	+1·7
English Channel ...	81·2	+2·5	0·08	2	—15	2	5·4	+2·7
Week ending: 9th Feb.:								
England, N.E. ...	80·3	+6·6	0·50	13	+ 4	6	1·7	—0·7
England, E.	80·8	+7·3	0·32	8	— 1	6	1·8	—0·6
Midland Counties ...	81·1	+7·9	0·94	24	+12	6	1·3	—0·8
England, S.E. ...	81·0	+6·6	0·49	12	— 2	6	0·9	—1·2
England, N.W. ...	81·2	+7·2	1·24	32	+15	6	1·7	—0·3
England, S.W. ...	81·7	+6·6	1·20	31	+11	6	1·6	—0·6
English Channel ...	82·1	+4·5	0·45	11	— 5	5	2·1	—0·5
Week ending 16th Feb.:								
England, N.E. ...	79·4	+4·6	0·29	7	— 2	4	1·1	—1·6
England, E.	79·8	+5·5	0·20	5	— 6	3	2·0	—0·7
Midland Counties ...	80·4	+6·4	0·24	6	— 6	3	0·9	—1·5
England, S.E. ...	80·2	+4·5	0·10	3	—11	2	1·7	—1·0
England, N.W. ...	80·2	+5·2	0·78	20	+ 5	4	0·5	- 2·0
England, S.W. ...	81·2	+5·4	0·28	7	—13	3	0·8	—1·9
English Channel ...	81·4	+2·8	0·21	5	—14	3	2·3	—1·0
Week ending 23rd Feb:								
England, N.E. ...	77·9	+1·9	0·24	6	— 2	2	3·0	+0·3
England, E.	77·4	+0·9	0·12	3	— 4	1	4·2	+1·2
Midland Counties ...	77·4	+1·2	0·18	5	— 4	2	2·8	+0·1
England, S.E. ...	77·4	—0·1	0·15	4	— 6	2	4·1	+1·0
England, N.W. ...	78·9	+2·8	0·89	23	+ 9	4	1·4	—1·3
England, S.W. ...	78·9	+1·8	0·33	9	— 6	3	2·0	—1·1
English Channel ...	79·7	0·0	0·14	3	—11	3	3·6	+0·1

* 1 inch—2·54 centimetres.

AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of February, 1916, 1917, and 1918.

—	WHEAT. 1916. s.	d.	WHEAT. 1917. s.	d.	WHEAT. 1918. s.	d.	BARLEY. 1916. s.	d.	BARLEY. 1917. s.	d.	BARLEY. 1918. s.	d.	OATS. 1916 s.	d.	OATS. 1917. s.	d.	OATS. 1918. s.	d.
London ...	58	11	77	5	72	9	52	2	64	9	60	4	33	6	49	2	57	0
Norwich ...	56	1	75	1	72	3	53	1	62	0	58	1	31	6	47	2	50	5
Peterborough	56	11	75	8	71	8	52	2	63	1	59	8	31	11	47	3	48	0
Lincoln ...	58	5	77	0	71	10	52	9	63	11	59	10	31	6	46	9	56	5
Doncaster ...	58	5	75	9	71	8	53	4	63	5	57	4	31	11	46	9	54	9
Salisbury ...	57	4	75	3	71	9	54	4	63	5	58	8	32	9	46	5	53	6

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan. 5 ...	55	8	76	0	71	2	47	8	66	4	58	0	31	5	47	1	45	5
,, 12 ...	56	7	75	8	71	2	48	6	65	7	58	2	31	11	47	2	46	9
,, 19 ...	57	2	75	8	71	3	49	6	64	9	58	1	32	6	47	4	47	9
,, 26 ...	58	0	75	10	71	1	51	0	64	5	58	7	32	11	47	8	48	2
Feb. 2 ...	58	3	75	10	71	2	52	5	64	0	58	10	32	4	47	3	50	2
,, 9 ...	57	6	76	0	72	0	52	10	63	5	59	0	32	2	46	11	50	6
,, 16 ...	56	11	76	3	72	3	53	6	63	8	58	11	31	9	47	3	52	0
,, 23 ...	58	2	76	9	72	2	54	2	63	9	58	9	32	2	47	8	52	3
Mar. 2 ...	59	4	77	4	72	2	55	7	64	0	57	9	32	4	48	0	52	0
,, 9 ...	58	2	78	0	72		55	6	63	7	58	5	32	3	48	7	52	2
,, 16 ...	57	9	78	10			55	4	64	1	56	10	31	10	49	4	51	0
,, 23 ...	55	11	80	3			54	6	65	6			31	4	50	4		
,, 30 ...	53	6	81	5			53	8	71	10			30	5	51	10		
Apl. 6 ...	51	8	84	4			53	7	69	11			30	1	55	1		
,, 13 ...	53	2	85	2			53	1	71	10			30	7	57	2		
,, 20 ...	55	3	84	10			52	10	70	6			31	8	59	8		
,, 27 ...	56	3	81	1			53	5	69	5			32	4	58	6		
May 4 ...	55	7	77	7			53	1	64	4			32	10	54	9		
,, 11 ...	55	5	78	0			53	5	64	11			33	1	55	2		
,, 18 ...	55	0	77	11			52	10	64	10			33	0	55	2		
,, 25 ...	54	7	78	0			52	9	64	9			33	4	54	11		
June 1 ...	53	3	78	0			53	9	65	11			33	3	54	11		
,, 8 ...	51	2	78	0			52	8	67	7			32	7	55	0		
,, 15 ...	48	10	78	2			50	9	75	6			32	1	55	1		
,, 22 ...	47	6	78	1			49	10	75	0			31	3	55	2		
,, 29 ...	46	3	78	3			49	1	73	11			30	10	55	1		
July 6 ...	46	3	78	1			45	6	69	5			30	8	55	2		
,, 13 ...	48	11	78	2			47	5	70	10			31	6	55	1		
,, 20 ...	51	6	78	3			48	8	72	1			32	3	55	2		
,, 27 ...	53	5	78	3			47	2	65	7			32	5	55	2		
Aug. 3 ...	55	1	78	2			46	1	73	6			32	9	55	0		
,, 10 ...	56	7	78	4			46	11	76	1			31	2	55	0		
,, 17 ...	58	1	78	7			48	0	68	11			30	8	55	6		
,, 24 ...	59	0	76	7			47	1	70	7			31	6	54	7		
,, 31 ...	59	4	72	1			48	5	60	4			30	5	49	0		
Sept. 7 ...	59	3	71	6			51	7	59	3			31	1	46	7		
,, 14 ...	59	11	70	7			52	6	57	2			30	9	45	0		
,, 21 ...	59	4	70	8			53	3	56	10			30	9	45	8		
,, 28 ...	58	10	70	6			54	1	58	5			31	1	44	7		
Oct. 5 ...	59	2	70	8			54	5	57	9			30	9	44	9		
,, 12 ...	59	7	71	0			53	10	58	5			31	6	44	5		
,, 19 ...	60	9	70	8			53	8	59	3			31	11	44	1		
,, 26 ...	62	10	70	10			54	6	60	1			32	10	43	0		
Nov. 2 ...	66	7	70	4			56	2	59	11			34	0	42	4		
,, 9 ...	69	8	70	3			58	0	60	2			35	8	42	11		
,, 16 ...	70	9	70	3			59	8	60	2			37	8	43	0		
,, 23 ...	70	8	70	2			61	8	59	9			39	7	43	1		
,, 30 ...	71	3	70	2			63	1	59	3			41	4	44	6		
Dec. 7 ...	72	1	70	7			65	6	58	7			44	1	43	5		
,, 14 ...	73	2	71	2			66	5	58	0			45	10	43	6		
,, 21 ...	74	8	71	1			67	3	57	7			46	5	44	2		
,, 28 ...	75	10	71	1			67	5	57	7			47	4	44	10		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in February and January, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	FEBRUARY.		JANUARY.	
	First Grade.	Second Grade.	First Grade.	Second Grade.
	per cwt. live weight	per cwt. live weight	per cwt. live weight.	per cwt. live weight.
FAT STOCK:—				
Cattle:—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Polled Scots	75 4	70 0	75 0	70 0
Herefords	75 1	70 1	75 0	70 0
Shorthorns	75 0	70 0	75 0	70 0
Devons	75 0	70 0	75 0	70 0
Welsh Runts	75 0	70 0	75 0	70 0
Fat Cows	70 0	62 0	70 0	62 0
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	17¼	15¾	17¼	15½
Sheep:—				
Downs	14¼	14¼	18	17¼
Longwools	14¼	14¼	17¾	17
Cheviots	14¼	14¼	18¼	17½
Blackfaced	14¼	14¼	17½	16¾
Welsh	14¼	14¼	17¾	16¾
Cross-breds	14¼	14¼	18	17¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs:—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Bacon Pigs	18 0	18 0	18 0	18 0
Porkers	18 0	18 0	18 0	18 0
LEAN STOCK:—	per head.	per head.	per head.	per head.
Milking Cows:—	*£ s.*	*£ s.*	*£ s.*	*£ s.*
Shorthorns—In Milk ...	54 14	42 19	55 0	43 9
,, —Calvers ...	49 12	39 7	51 4	41 0
Other Breeds—In Milk ...	50 16	39 7	50 6	38 3
,, —Calvers ...	—	—	—	—
Calves for Rearing	4 5	3 6	4 0	3 2
Store Cattle:—				
Shorthorns—Yearlings ...	17 12	14 19	17 9	15 2
,, —Two-year-olds...	27 4	23 5	27 3	22 18
,, —Three-year-olds	34 5	30 15	35 3	31 1
Herefords —Two-year-olds...	28 16	25 1	29 6	25 0
Devons— ,,	28 10	25 8	26 7	22 12
Welsh Runts— ,,	27 15	24 15	27 3	22 13
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Downs or Longwools ...	77 6	66 2	72 0	59 4
Store Pigs:—				
8 to 12 weeks old	36 8	31 0	32 5	24 7
12 to 16 ,, ,, ...	58 6	45 7	55 3	40 8

* Estimated carcass weight.

NOTE.—The February prices per lb. for sheep do not include the value of the skins, which made prices equivalent to an additional 2*d.* per lb. of the dressed carcases weight for Downs, Cheviots and Cross-breds, 2¼*d.* for Longwools and 1¾*d.* for Black-faced and Welsh.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in February, 1918.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF:—						
English	1st	116 6	116 6	—	116 6	116 6
	2nd	116 6	116 6	—	116 6	116 6
Cow and Bull	1st	116 6	116 6	116 6	116 6	116 6
	2nd	116 6	116 6	116 6	112 0	116 6
Irish: Port Killed	1st	—	—	116 6	116 6	116 6
	2nd	—	—	116 6	116 6	116 6
Argentine Frozen—						
Hind Quarters	1st	107 6	107 6	107 6	107 6	107 6
Fore „	1st	88 6	88 6	88 6	88 6	88 6
Argentine Chilled—						
Hind Quarters	1st	107 6	107 6	107 6	107 6	107 6
Fore „	1st	88 6	88 6	88 6	88 6	88 6
American Frozen—						
Hind Quarters	1st	—	—	—	—	—
Fore „	1st	—	—	—	—	—
VEAL:—						
British	1st	112 0	116 6	—	115 6	116 6
	2nd	112 0	112 0	114 6	112 0	114 6
Foreign...	1st	—	—	—	—	—
MUTTON:—						
Scotch	1st	128 6	128 6	128 6	128 6	128 6
	2nd	128 6	128 6	128 6	128 6	128 6
English...	1st	128 6	128 6	—	128 6	128 6
	2nd	128 6	128 6	—	128 6	128 6
Irish: Port Killed	1st	—	—	128 6	128 6	128 6
	2nd	—	—	128 6	128 6	128 6
Argentine Frozen	1st	107 6	107 6	107 6	107 6	107 6
New Zealand „	1st	—	—	—	—	—
Australian „	1st	—	—	—	—	—
LAMB:—						
British	1st	—	—	—	—	—
	2nd	—	—	—	—	—
New Zealand	1st	—	—	—	107 6	—
Australian	1st	—	—	—	—	—
Argentine	1st	107 6	107 6	107 6	107 6	107 6
PORK:—						
British	1st	133 0	133 0	—	133 0	—
	2nd	133 0	133 0	—	133 0	—
Frozen	1st	119 0	119 0	—	-	—

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in February, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
BUTTER:—	*s. d.* per 12 lb.	*s. d.* per 12 lb.	*s. d.* per 12 lb.	*s. d.* per 12 lb.	*s. d.* per 12 lb.	*s. d.* per 12 lb.
British	—	—	—	—	28 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
" Factory	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
CHEESE:—						
British—						
Cheddar	152 0	—	—	—	152 0	—
			120 lb.	—	120 lb.	—
Cheshire	—	—	160 0	—	162 6	—
			per cwt.	—	per cwt.	—
Canadian	130 6	—	130 6	—	130 6	—
BACON:—						
Irish (Green)	182 0	—	181 0	—	182 0	—
Canadian (Green sides)	—	—	177 0	—	178 0	177 0
HAMS:—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	170 6	—	170 0	—	171 0	—
EGGS:—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	43 9	40 10
Irish	40 4	—	40 3	38 10	41 6	39 6
Egyptian	22 6	21 7	21 10	20 1	22 9	20 0
POTATOES:—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	152 6	140 0	125 0	117 6	148 6	138 6
Edward VII.	154 0	141 0	135 0	130 0	144 0	134 0
Up-to-Date	150 0	135 0	125 0	117 6	—	—
HAY:—						
Clover	—	—	—	—	147 6	140 0
Meadow	—	—	—	—	147 6	140 0

DISEASES OF ANIMALS ACTS, 1894 to 1914.

Number of Outbreaks, and of Animals Attacked or Slaughtered.

GREAT BRITAIN.

(*From the Returns of the Board of Agriculture and Fisheries.*)

Disease.	February.		Two Months ended February.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	24	61	54	117
Animals attacked	29	71	62	131
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks...	1	2	3	5
Animals attacked	1	6	4	9
Parasitic Mange:—				
Outbreaks	666	347	1,253	680
Animals attacked	1,231	737	2,403	1,445
Sheep-Scab:—				
Outbreaks	67	111	161	252
Swine Fever:—				
Outbreaks	42	150	113	309
Swine slaughtered as diseased or exposed to infection	11	40	35	103

IRELAND.

(*From the Returns of the Department of Agriculture and Technical Instruction for Ireland.*)

Disease.	February.		Two Months ended February.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	—	1	—	2
Animals attacked	—	1	—	2
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	1	—	1
Animals attacked	—	1	—	1
Parasitic Mange:—				
Outbreaks	21	2	35	7
Sheep-Scab:—				
Outbreaks	56	57	106	124
Swine Fever:—				
Outbreaks	1	19	2	31
Swine slaughtered as diseased or exposed to infection	13	133	14	199

SELECTED CONTENTS OF PERIODICALS.

Agriculture, General and Miscellaneous—

Uber Heidekultur, *Dr Luedecke* (Jour fur Landwirtschaft, 65 Band Heft II, 1917) [63 142]

The Growth of International Trade in Manures and Foods *J Hendrick*. (Trans Highland and Agric Soc, 1917) [63 1621, 63 604(a)]

Modern Ensilage Practice *A W Oldershaw* (Trans Highland & Agric. Soc, 1917) [63 198]

Le Sang desséché en Agriculture *M Sirot et G Joret* (Ann Sci. Agronom, October, December, 1916) [63 163]

Total Nitrogen and Carbon in Cultivated Land and Land Abandoned to Grass and Weeds *A W Blair* and *H C McLean* (Soil Science, Vol IV, No 4, October, 1917) [63 113]

Field Crops—

Report on an Experiment on the Manuring of Oats, *W G R Paterson* (Trans Highland and Agric Soc, 1917) [63 314]

Production and Uses of Rice (Bull Imperial Inst, Vol XV, No 2, April–June, 1917) [63 319]

Plant Diseases—

Frit Fly (*Oscinus Frit*) attacking Winter Wheat *F R Petherbridge* (Ann App Biol, September, 1917) [63 27]

Some Farm Insects observed in the Aberystwyth Area, 1913–1916, *C L Walton* (Ann App Biol, September, 1917) [63 292 (42)]

Biologic Forms of *Puccinia graminis* on Cereals and Grasses, *E C Stakman* and *F J Piemeisel* (Jour Agric Research, August 27th, 1917) [63 24]

Studies in Greenhouse Fumigation with Hydrocyanic Acid Physiological Effects on the Plant, *W Moore* and *J J Willawan* (Jour Agric Research, 12th November, 1917) [63 294]

Fungus Fairy Rings in Eastern Colorado and their Effect on Vegetation, *H L Shantz* and *R L Piemeisel* (Jour Agric Research, 20th October, 1917) [63 24]

First Progress Report of Special Committee of the Commonwealth Advisory Council of Science, etc, on Damage by Insects to Grain in Store (Jour Dept Agric, Victoria, August, 1917) [63 27 31]

Hydrocyanic Acid Gas as a Soil Fumigant, *E R de Ong* (Jour Agric Research, 26th November, 1917) [63 294]

Live Stock—

The Inheritance of Mutton Points in Sheep, *K J J Mackenzie* and *F H A Marshall* (Trans Highland and Agric Soc, 1917) [63 63(04)]

The Breeding and Management of Pigs, *W Bruce* (Trans Highland and Agric Soc, 1917) [63 64(04)]

Note on the Commercial Aspect of Pig Feeding, *R Wilson* (Trans Highland and Agric Soc, 1917) [63 64]

Dairying and Food, General—

The Increase and Development of Dairy Live Stock, *J Mackintosh* (Jour Brit Dairy Farmers Assn, Vol XXXI, 1917) [63 711 63 7(42)]

The Present Position and Future Developments of Dairy Education Practice, *P McConnell*, Science, *J Mackintosh* (Jour Brit Dairy Farmers Assn, Vol XXXI, 1917) [37 637]

Dairy Bacteriology Part I—The Bacteriology of Milk, *W Stevenson*. (Trans Highland and Agric Soc, 1917) [576 8]

Milking Machines Report on an Investigation by the Society regarding the Use of Milking Machines in Scotland, *W Burkitt* (Trans Highland and Agric. Soc, 1917) [63 713]

Forestry—

Hedges: Their Care and Management, *J H Milne Home* (Trans Highland and Agric Soc., 1917) [63 499]

Uber die Begrenzung der Mistelrassen und die Disposition ihrer Wirtspflanzen, *C. von Tubeuf* (Zeit. für Pflanzenkrank Heft 5/6, 1917) [63·49·2]

ADDITIONS TO THE LIBRARY.

Agriculture, General and Miscellaneous—

Johnson, A. F. M.—Useful Wild Plants: Where to Find Them, How to Use Them. (23 pp.) Cheltenham: Looker-on Printing Company. n.d. 2*d*. [63.348.]

Sutton, M. H. F.—Bull. 8:—Experiments with Humogen in Comparison with other Fertilisers. (12 pp.) Reading: Sutton & Sons, 1917. 2*s*. 6*d*. net. [63.168.]

Bosworth, G. F.—Agriculture and the Land. (93 pp.) Cambridge: University Press, 1917. 1*s*. 6*d*. [63(022).]

Wibberley, T.—Farming on Factory Lines: Continuous Cropping for the Large Farmer. (262 pp.) London: C. A. Pearson, 1917 5*s*. net. [63.3(02); 63.191.]

Field Crops—

Kirkland, J.—Three Centuries of Prices of Wheat, Flour and Bread. War Prices and Their Causes. (64 pp.) London: Published by the Author at the Borough Polytechnic, 1917. 3*s*. [63.311.31.]

Crookes, Sir W.—The Wheat Problem. [3rd edition.]. With chapter on Wheat Supplies, by *Sir R. Henry Rew*. (100 pp.) London: Longmans Green & Co., 1917. [63 311·38]

Live Stock—

Bangor, University College of N. Wales, Department of Agriculture.—Breeding Experiments with Welsh Mountain Ewes for the Production of Fat Lambs, 1913–1916. (8 pp.) Bangor. n.d. [63.63(04)]

U.S. Department of Agriculture.—Bull. 504—The Theory of Correlation as applied to Farm-Survey Data on Fattening Baby Beef. (15 pp.) Washington, 1917. [612.394]

Ormsby, H. P.—The Nutrition of Farm Animals. (743 pp) New York: The Macmillan Company, 1917. [63.604; 612.394.]

Wood, T. B.—Composition and Nutritive Value of Feeding Stuffs. (14 pp.) London: Cambridge University Press, 1917. 1*s*. net. [63.604.]

Dairying and Food, General—

Wood, T. B.—The National Food Supply in Peace and War. (43 pp.) London: Cambridge University Press. 1917 6*d*. net. [31(42); 63.604.]

Edinburgh and East of Scotland, College of Agriculture—Experiments on the Use of Palm Kernel Nut Cake as a Food for Dairy Cows. (8 pp.) Edinburgh, 1916. [63.604(*a*).]

Larson, C. W., and *Putney, F. S*—Dairy Cattle Feeding and Management. (471 pp) New York: J. Wiley & Sons. London: Chapman and Hall, 1917. [63.711].

Walker-Tisdale, C. W., and *Woodnutt, W. E.*—Practical Cheesemaking. (182 pp.) London: Headley Brothers, 1917. 4*s*. 6*d*. net. [63.73(02).]

Birds, Poultry, and Bees—

Gunther, R. T.—Report on Agricultural Damage by Vermin and Birds in the Counties of Norfolk and Oxfordshire in 1916 (92 pp.) London: Oxford University Press, 1917. [63.269.]

Curtis, M. R.—Studies on the Physiology of Reproduction in the Domestic Fowl. (181–213 pp. + III. plates.) [Reprinted from Biological Bulletin, Vol. XXXI., No. 3. September, 1916] [63.65(04).]

U.S. Department of Agriculture.—Farmers' Bull. 801:—Mites and Lice on Poultry. (27 pp.) Washington, 1917. [619.5.]

Forestry—

Troup, R. S.—Work of the Forest Department in India. (65 pp.) Calcutta, 1917. 5*d*. [63.49(54).]

Engineering—

Concrete Utilities Bureau.—No. 1:—Concrete: A Unique Building Materia and Substitute for Timber, Bricks, Iron and Steel. (9 pp.) London: Concrete Utilities Bureau, n.d. [69(04).]

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NOTE.—References to Insects, etc., and Fungi are indexed under the headings "Insects, etc.," and "Fungi" only, to Weeds under the headings "Weeds" only, to Fruit under the heading "Fruit" only, and to General Notices, etc., issued by the Food Production Department of the Board under the heading "Food Production."

The names of the research and experiment stations at which the experiments summarised in the *Journal* have been conducted are indicated in italics, thus:—(*Rothamsted*). In the case of experiments conducted abroad, the name of the country is given.

Articles or reports on the following subjects appear in the *Journal* each month or from time to time, and are not separately indexed:—Notes on Feeding Stuffs Notes on Manures, Unit Prices of Artificial Manures, Notes on Crop Prospects, and Live Stock Abroad, Notes on the Weather, Notes on Agricultural Labour in England and Wales, Notes on Agricultural Conditions in England and Wales, Prices of Agricultural Produce, Outbreaks under the Diseases of Animals Acts, Prevalence of Animal Diseases on the Continent, Lists of Additions to the Board Library, and Selected Contents of Periodicals.

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GRASS LAND AND PLOUGHED LAND.

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No. 16.—I. Some Aspects of the Dairying Industry of England and Wales II. The Cost of Milk Production	Sept., 1916

THIS paper was written before the provisions of the Corn Production Bill were made public. It is of the utmost importance that farmers in cattle-rearing districts, now largely under grass, should realise the indirect as well as the direct benefits that they may derive by responding whole-heartedly to the Nation's call.

An endeavour has been made to show that by ploughing up large areas of poor grass the farmer has the opportunity of converting inferior grazing into productive temporary leys, and by adopting a more intensive system of farming he may, besides growing an extended acreage of corn, add considerably to his cattle output.

The period covered by the Corn Production Bill is sufficient for the grazier to establish a regular sequence of high-class leys, and therefore, apart altogether from any question of the continuance or termination of guaranteed prices, the far-sighted farmer should be in a better position with reference to cattle production than formerly. It must be pointed out that by resort to adequate seeds mixtures and the inclusion of wild white clover, a good sward can be obtained with a degree of certainty and rapidity that makes the breaking up of grass land a very different proposition for the modern farmer than it was for his predecessor of a generation ago. The recommendations made under "Improvement by Breaking the Turf" contemplate more particularly land not well adapted to the production of wheat. On land naturally suited to arable farming a continuous succession of crops can be maintained, except on occasion when a summer fallow may be desirable.

There is, however, just as much scope for summer ploughing on less fertile soils. It is, moreover, this aspect of the breaking up of grass land, with the two-fold object of its ultimate improvement and the current production of crops, that needs to be brought home to the grazier if it is hoped to induce him to plough a really substantial proportion of his unproductive grass.

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GRASS LAND AND PLOUGHED LAND.

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INTRODUCTION.

THE need for an increased output of home-grown food demands that the question of our grass land in relation to production should receive the careful and unbiassed consideration of the agricultural community. It is manifest that the Nation's new call for cereals and potatoes should, as far as possible, be permanently met without unduly diminishing the stocks of cattle and sheep in the country. Much has been written in the agricultural press against an extensive policy of breaking up grass land. It is, however, too often assumed that all grass lands are alike; it must be constantly born in mind that much of the grass in this country is so inferior that if ploughed and turned to arable account the loss to the grazier would be almost negligible. It should be remembered also that an arable rotation can be made to provide both summer and winter keep for stock, and that by resort to a certain amount of catch-cropping the grazing from the rotation may be materially extended.

In this country, however, with its varied geological and climatic conditions, there are many districts where—even under a greatly improved system of agriculture—grass will for a long time to come take a prominent, although no longer overwhelming, position in the methods of farming practised. A maximum increase in our food supplies can therefore only be obtained if endeavours to extend the area under the plough go hand in hand with plans for the improvement of grass land.

The principle of co-ordinated grass land improvement and arable extension should be applied to both individual farmers and to localities as a whole. A farmer in a grass-land district who decides to break, say, five acres should consider plans for improving an equal area of his remaining grass. If the general policy adopted by Essex, for instance, is to revert to wheat growing on a wholesale scale, that of Cardiganshire or other county of high rainfall should be both to extend its cattle output and to aim at becoming practically self-supporting in the matter of concentrated feeding stuffs. This would demand an extensive scheme of grass land improvement and some modification in the rotations subservient to cattle production.

In the past the tendency has been to regard the improvement of grass land as one aspect of husbandry and the growing of good arable crops as another. The work of Somerville, Gilchrist and others, on the value of basic slag and wild white clover has, however, clearly shown the relation that exists between a good turf ploughed down whilst still full of clover and high arable farming. It must be insisted, therefore, that the improvement of grass land is not an end in itself; it does not merely entail top dressings and kindred treatments, but may demand for its attainment a more or less complete modification in the methods of husbandry and should under clever management re-act on the fertility of the whole farm.

TYPES OF GRASS LAND.

Before passing to detailed consideration of the various methods of improvement it will be necessary to devote a short section to types of grass land. Grass land in Britain may be classified as (*a*) Permanent, (*b*) Outrun, and (*c*) Leys.

(*a*) **Permanent Grass.**—Properly considered, permanent grass includes fields that have been down for over twenty years—much of the best grass in the country has been down for over 100 years. Permanent grass is usually made the subject of restrictive covenants in leases. Permanent grass varies very much in quality from locality to locality. It ranges from the famous fattening pastures of Northamptonshire and adjacent counties, capable of fattening a beast per acre without added feeding stuffs, to rush and sedge pastures or mountain and hill grazing capable of carrying a few store cattle or sheep and ponies only. The essential characteristic of all permanent grass is that it is natural or semi-natural. That is to say, the herbage consists almost entirely of indigenous species that are proper to the various conditions of soil and climate. These indigenous species take time to establish themselves; and selection in favour of the more desirable plants is exercised by the scientific application of adequate manures, and judicious stocking. It is for this reason that permanent grass has, perhaps, acquired an exaggerated reputation in the eyes of both landlords and tenants.

The better classes of permanent grass would seem, in part at least, to owe their quality to the fact that perennial rye-grass, meadow fescue, rough-stalked meadow-grass and meadow foxtail are indigenous on many of the more fertile soils, and usually take a predominant place in the herbage. Yorkshire fog is, however, frequently abundant on high-class grass lands, especially on soils which are retentive of moisture. Crested dog's-tail and sweet vernal grass, with smooth-stalked meadow-grass and the various fine-leaved fescues, usually take a more prominent place in second-class grass lands, on which perennial rye-grass does not usually contribute more than 15 to 20 per cent. to the herbage, and the other valuable species are but slightly represented. The poorest classes of grass, devoted chiefly to carrying store cattle and sheep, consist for the most part of bent (*Agrostis*), sheep's fescue and heath grass, with sweet vernal grass (on the wetter situations), soft brome (on dry situations) and small amounts of crested dog's-tail.*

An abundance of white clover has been shown by Carruthers, Fream, and Armstrong† to be an important characteristic of all the best permanent grass. White clover is, however, an indigenous plant which contributes in varying amount to the herbage on the great majority of grass lands. Wild red clover is natural on some classes of superior and poor grass alike. Other leguminous herbs met with on natural and semi-natural grass land are the meadow and mountain vetchling, bird's-foot trefoil, yellow suckling clover, trefoil and sometimes also the tufted vetch. Since the valuable grasses occur abundantly on first-rate permanent grass, it is often assumed that an equally good herbage can be established on poor soils by the indiscriminate introduction of the seed of these plants. The improvement of permanent grass is not, however, best achieved by this means. The aim should rather be to make poor soils more fertile, and therefore better suited to the valuable grasses, when the appropriate indigenous species will sooner or later make a natural appearance.

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* Types of grass land are considered in more detail by Stapledon & Jenkin (18) and references to literature are given.

† See, *e.g.*, Armstrong (2), Fream (6), and Carruthers (3).

The case of white clover is different to that of the grasses, since it is indigenous to some extent on nearly all types of grass land. The introduction of the seed of wild white clover (the indigenous species) will therefore hasten the appearance of this plant, and is consequently a potent factor in the improvement of the most inferior grass lands on the poorest of soils.

It is usually only possible to alter any particular class of grass land in the direction of the class next better than itself in the scale. The poorest types, such as some mountain and hill grazing, may thus be converted into tolerable pastures with white clover, crested dog's-tail, red fescue, and even rough-stalked meadow-grass taking an appreciable place in the herbage. Such an improved hill pasture would be able to carry a greatly increased and more varied head of stock. Grass now only carrying store cattle and sheep with a flora consisting chiefly of bent (*Agrostis*) with some few leguminous plants may, under proper management, be converted into a herbage full of white clover, with crested dog's-tail and red fescue taking a prominent place, and rye-grass and rough-stalked meadow-grass contributing something to the flora. Fields so improved would be able to maintain "forward" animals and would be of some value to the dairy farmer. Similarly, second-class grass may be converted into a herbage capable of carrying larger and better herds of dairy cattle or fattening a beast with the assistance of a certain amount of added feeding stuffs. The "fattening" pastures of course only require proper management for their fertility to be indefinitely maintained. The adoption of this graduated method of grass land improvement would so add to the available herbage of the country that thousands of acres of poor and moderate grass could be brought under an intensive arable rotation without appreciably affecting the grazier.

Large areas under permanent grass are consequently only compatible with sound farming (1) if the grass maintains a high degree of productivity without resort to excessive manuring (*e.g.* the fattening pastures), (2) if the soil is so poor, or the fields so steep or inaccessible that they cannot be made to produce remunerative arable crops, and (3) on the very heavy clays incapable of cultivation.

In districts of poor grass, which require heavy manuring for the productivity to be maintained at a reasonable level, the permanent grass should be restricted to those fields best capable of taking a sward. In these localities the area under permanent grass should not be greater than the farmer is both prepared and able to manure on a generous scale.

(*b*) **Outrun Grass.**—Outrun grass falls under two distinct categories. It consists of: (1) *Senile Leys*, that is to say, leys that have either tumbled down without sowing from a corn stubble, or owe their origin to an outrun sainfoin breadth or to an inadequate original seeding. They vary in age from three to about fifteen years, have probably not been manured, and usually consist chiefly of Yorkshire fog or soft brome (under meadow conditions) and bent (under pasture conditions). They constitute about the most unproductive class of grass in the whole country. (2) *Outrun Permanent Grass*, or grass that has been allowed to deteriorate gradually under bad management, perhaps owing to lack of attention to the existing drainage systems, to manures being continually withheld, or to prolonged stocking with one class of animal only, or more often owing to the long-continued taking of hay. Outrun permanent grass, like outrun leys, consists chiefly of Yorkshire fog or bent, with excess of weeds such as yellow rattle, knapweed, ribgrass, cat's ear and other mat herbs. In the last resort outrun grass of both types is the heritage of the policy which has led to a diminution in the rural population, amalgamation of farms, more grass, fewer homesteads and less manure.

The position of the country as to outrun grass is the more serious because it owes its origin primarily to neglect and, therefore, occurs on soils that should either be yielding arable crops or much improved grass. The area under this type of grass is also very considerable. The writer has mapped a large tract of country in mid-Wales where the proportion of outrun grass to the total area of tended (as opposed to mountain and hill grazing) land amounts to over 30 per cent. This figure may probably be taken as a fair average for the amount of outrun grass in many other cattle-rearing districts.

(*c*) **Leys.**—Leys are either (1) rotation or (2) temporary meadows or pastures. A rotation ley is usually devised to give one crop of hay and an aftermath; occasionally two year's hay or one hay crop and a subsequent year's grazing. Temporary leys are put down for various periods from three to about eight years. Under conditions of high farming they should only be left down during their period of continuous productivity.

THE IMPROVEMENT OF GRASS LAND: GENERAL CONSIDERATIONS.

It is proposed in this paper to take a broad view of the improvement of grass land. Plans of improvement should aim at obtaining the maximum amount of keep from fields under grass. The possible methods to be employed must therefore not only include drainage, top dressings, renovating mixtures, altered methods of stocking, or re-seeding, but if necessary, also the adoption of considerably modified rotations.

In the case of essentially grass-land and cattle-rearing districts it is remarkable that the rotations practised have not been devised so as to make for maximum productivity from the grass land. There are thousands of acres of land in this country where, no matter how excellent the seed mixtures used, it is impossible to maintain a fully productive herbage for more than about four years—unless manures are employed on practically a prohibitive scale. It is true that the herbage improves after a middle period of great inferiority. Under the system practised in many districts a ley gives a good crop of hay in its first year, begins to deteriorate in the second, is of very poor quality in the third, fourth, and fifth years, and subsequently settles down to an improved but always poor herbage. Now it does not appear to be sound farming to leave a field down for six to eight years in order that a short period of somewhat improved grazing may be obtained. Matters are worse when, as is often the case if manures are wholly withheld, no appreciable improvement comes about. There can, moreover, be no justification for such a system if, by the use of proper seed and adequate manures, it is possible to establish a ley which will maintain unbroken productivity for a period of about four years.

IMPROVEMENT OF GRASS LAND: PRACTICAL METHODS.

The problem for the grass land farmer consists of three parts :—

(*a*) How with the labour and machinery at his disposal to extend his rotation land to stand in a reasonable and economic relation to his area under permanent grass ;

(*b*) How to improve his remaining grass ; and

(*c*) How to establish high class temporary leys.

It will be necessary first to consider methods of improvement which do not involve breaking the existing turf and re-seeding or altering the rotations. Wherever possible, improvements on these lines should precede the breaking of grass land, for the obvious reason that a good turf will make better rotation land than an outrun one. The means which may be usefully employed are: (1) top dressing, (2) renovating mixtures, (3) altered methods of stocking, (4) substituting pasture for meadow conditions or the reverse, (5) eradication of weeds, and (6) drainage.

(1) **Top Dressings.**—The permanent improvement of pastures by top dressings depends chiefly upon the action of suitable treatments on leguminous herbs. It is fortunate that all types of grass land include some of these herbs in their flora; for although white clover is pre-eminent, bird's-foot trefoil and yellow suckling clover respond almost equally well to slag, and the meadow vetchling to superphosphate. An increased development of these noduliferous plants tends to accumulate fertility in the soil, and this re-acts favourably upon the valuable indigenous grasses. The various legumes are largely dependent on sufficient supplies of phosphates, potassic salts and lime for their maximum development. Lime is of course abundantly present in many of our soils. Kainit or other potassic fertilisers are frequently not necessary on grass land in this country, but it is often expedient to use potash in one form or another on gravelly soils, and applications of this fertiliser are sometimes beneficial on shallow soils even in districts of high rainfall. Potassic fertilisers are essential to good clover development on poor upland pastures in many parts of Merionethshire. They have, however, proved quite useless on many types of upland grazing.

In recent years the most remarkable results have been obtained by liberal dressings of basic slag, and it is now realised that slag is capable of re-acting excellently on many classes of calcareous soil. Superphosphate, however, in some localities gives better results than basic slag, and on some shallow soils in non-calcareous districts superphosphate in conjunction with lime answers rather better than slag. Trials should therefore be conducted in every characteristic district to establish definitely the best means of applying phosphates to the local grass land. The value of lime to grass land has been somewhat overshadowed of late by the results everywhere obtained by basic slag. The writer has, however, been able to report on cases where the addition of lime to slagged areas has been of the greatest importance (16). Lime in many non-calcareous districts is practically essential to first-rate barley production and should also be largely employed to mitigate the ravages of finger-and-toe in the turnip fields. The lasting effects of lime in such districts, however, are to be seen on the grass land, where it not only has a marked influence on the clovers and valuable bottom grasses, but undoubtedly exerts, in some manner not yet explained, a definite effect on the palatability of the herbage.

As a top dressing lime or limestone in its various forms does not always produce the good results that may be legitimately expected of it; or at the best its action may be long delayed. The influence of quick lime (ground or lump) is often to detract from the productivity of the herbage for at least eighteen months after its application (25). The best and most certain way to apply lime to grass, therefore, would seem to be to put it on the rotation land before the "seeds" are sown. This aspect of liming is discussed below (p. 20). Lime composts applied to grass land do not have the same retarding influence on the herbage as lime spread alone, and undoubtedly afford an excellent means of putting lime directly on the herbage.* Composts, however, need to be made with great caution. Though road scrapings, so commonly used in many districts, are frequently a means of introducing the locally indigenous white clover and suckling clover, they are just as often responsible for the appearance of silver weed, in gregareous patches, all over a field.

Top dressings are often disappointing when applied to very "foggy" or mossy swards; if possible the "foggage" should be grazed down before the manures are spread; an application of salt may help to this end. It is also an advantage to harrow and break the surface as much as possible with either a specially-designed tined implement or with the ordinary toothed harrow.

The time of application of basic slag is not of prime importance on old grass lands; excellent results are frequently obtained when slag is not spread until March. Slag put on as late as June has also shown to advantage on the herbage by the autumn.† The trials at Cockle Park have proved that slag adds to the autumn and winter grazing better than other dressings, and recent trials at Hafod (Aberystwyth) also show that the herbage on plots treated with slag maintain a prolonged grazing season. If basic slag should become available in greater amount during the late spring, or if farmers have stocks over after tilling their arable area, it would probably be better to apply this to grass land in June rather than wait until the autumn, since autumn and winter keep will be of great value under present conditions. In the event of a dry summer, slag put on in June will probably not influence the autumn grazings, but it will re-act as well as later dressings upon the grass during the spring and summer of 1918.

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* It must be remembered that road scrapings alone often have an excellent influence on pastures, consequently the good results frequently obtained from the use of lime composts may not always be primarily due to the lime.

† Dr. Somerville states that he applied slag last June with excellent results.

The trials at Cockle Park show that sodium nitrate and ammonium sulphate, used in conjunction with phosphatic manures, retard the development of the clovers and may actually depress the productivity of the herbage; the results of trials in general would seem to show that even if the nitrogenous fertilisers do not always have a negative influence they do not leave a return on the outlay.

The feeding of cake to animals on grass land would similarly appear to have no beneficial influence on the herbage, and is, at the present time at all events, a practise to be condemned.

Farmyard manure in conjunction with basic slag has shown decidedly good results in recent trials in mid-Wales, and has had practically no retarding influence on the clovers compared to the " slag alone " plots. The Cockle Park trials seem also to suggest that good results are to be obtained from the judicious use of this combination.

(2) **Renovating Mixtures.**—A renovating mixture is probably only justified on fields where top dressings are unable to establish a development of leguminous herbs. The seeds to be sown should therefore consist chiefly of appropriate legumes such as wild white clover, bird's-foot trefoil and yellow suckling clover, with a little of such permanent grasses as crested dog's-tail and rough-stalked meadow-grass; perennial rye-grass would be added to act as a " nurse " and offer some protection to the smaller seedlings when stock are first turned in. Renovating should be followed up with liberal dressings of phosphatic manures. On calcareous soils, where the herbage is thin and a certain amount of earth is on the surface, the seeds may establish themselves without harrowing with a tined implement. Failure is often due, however, to the fact that the seedlings are unable to obtain a hold on the ground. It is always necessary in wet districts where the herbage covers all the surface to harrow frequently with a toothed harrow; this is best done when the land is wet. The harrowing should

be continued until the surface is considerably broken, when the seeds will have a moderate chance of obtaining a hold on the ground. Soil obtained from ditches or road sides may be usefully spread over the field to assist the young seedlings—care must be taken, however, that the soil used is not a carrier of weeds.

The seed for a renovating mixture is usually sown early in the spring or in the autumn, and the sowing should probably be done during wet weather.

(3) **Altered Methods of Stocking**.—Prolonged grazing with one class of animal only usually leads to deterioration in the herbage. Sheep exert some beneficial influence on pastures; but the running of sheep alone over large tracts of grass has been both directly and indirectly responsible for much harm. It cannot be too strongly emphasised that grass land left unmanured and practically ungrazed deteriorates much more rapidly than land over-stocked. The tendency for nearly all classes of grass land, if left alone, is to alter in the direction of scrub or other wild condition—an alteration that implies the substitution of the poorer grasses for the more valuable and a non-gramineous for a gramineous herbage. Sheep of a class will pick up "keep" from even poor grass. This fact has led to hedges and fences being allowed to go out of repair and the consequent selective grazing—the hopeless under-stocking of the poorer fields—has led to a rapid deterioration in the herbage. This in turn, since manures are withheld, has led to even greater under-stocking, and therefore a progressive falling off in the quality of the herbage. It is this negligent plan of sheep farming, under which anything from 75 to 100 per cent. of the holding has been, in effect, run merely as a ring-fenced sheep-walk, that is responsible for innumerable acres of derelict land in the country to-day.

The essential point for the grazier to work upon is that proper stocking encourages the valuable indigenous pasture grasses as nothing else will. If the best results are to be obtained from slag and other top dressings it is obvious, therefore, that fences must first be made good. Improved areas can carry more stock than neglected areas, but if the maximum results are to be looked for they must be supplied with the extra head of stock. When animals have access, at will, to improved and unimproved areas alike—an all too common condition under the existing state of fences on many farms—they naturally tend to congregate on the improved areas to the entire neglect of the unimproved, and the latter in consequence deteriorate rapidly. Under these conditions the aggregate grazing of the farm often becomes less than when improvements were first taken in hand.

What amounts to under-stocking often occurs on good grass land on which beasts are fattened with added feeding-stuffs. These animals have not to browse very closely for their keep; they therefore graze selectively. The result is that cock's-foot, Yorkshire fog and other grasses become coarse and tufted in patches all over the field. Hungry store cattle should follow after the butcher's beasts in order to complete the grazing. Grazing by cattle alone favours the spread of hardheads and ragwort, or by grazing sheep alone the creeping thistle is much encouraged.

Ponies do not usually combine well with other stock, but are very useful if they can be brought in or "tacked" to graze down a rough herbage prior to the application of fertilisers or to breaking the sod.

In conclusion it should be emphasised: (1) that it is impossible to stock a farm adequately unless it is well fenced; (2) clever stocking implies grazing the fields not only with a view to feeding the beasts but also with a view to improving the herbage; (3) sheep alone or "forward" and fattening beasts alone lead to a deterioration in the herbage; (4) the amount of stock which can be carried on a well-fenced, well-manured grass farm is out of all proportion to what the same farm would carry if badly fenced and unmanured; and (5) over-stocking is of course an evil, for not only does it lead to illness amongst the animals, but frequently to excessive consolidation of the ground in wet weather, and complete ruination of the herbage in dry weather. A good turf, however, withstands both drought and consolidation better than a poor one.

(4) **Substituting Pasture for Meadow Conditions, or the Reverse.**—It is often said that permanent fields should be put aside, as either pasture or meadows. This is undoubtedly a sound practice on fertile soils and where the management is good. On poor soils, but slightly manured, it is a practice strongly to be condemned. An indifferent herbage which yields hay year after year becomes full of Yorkshire fog, soft brome and yellow rattle. All these plants set and ripen an abundance of seed early; under meadow conditions they therefore gain progressively on the ground from year to year. Three or

four years' grazing always exerts a beneficial influence on such fields. The fields should be liberally dressed with basic slag, and subsequently with farmyard manure during the period of grazing; the full influence of the manures will then re-act on the herbage, since it will be possible to graze a large head of stock upon the field. It is always advantageous to delay the manuring until the pasture period commences; for when manures are added, and one or two further crops of hay are removed before the field is converted into a pasture, the fertilisers are largely carried away in the haycart. It is better to improve the herbage first and wait until the field is again converted into a meadow before recovering the value of the fertilisers in increased hay yields.

Poor pastures can be improved by taking one or two crops of hay. A poor pasture consists largely of bent which seeds late. If the hay is cut in good time a preponderant amount of seed will fall from such rye-grass, crested dog's-tail and wild clovers as may be present, to the ultimate advantage of the field. Yorkshire fog is not very common on poor pastures, although plentiful on many of the better classes of land; the taking of a hay crop is therefore not likely to favour the spread of this plant.

The field should not be manured for the benefit of the hay unless meadow conditions are to be maintained for a considerable period. Liberal manurial treatment would best follow when the field was again used as a pasture. A change from pasture to meadow conditions continued for a period of years tends to suppress such weeds as thistles and soft *Crepis*, and frequently also reduces moss.

(5) **Eradication of Weeds.**—A few brief notes are appended on the eradication of some of the worst weeds of grass land.

Docks.—These weeds frequently owe their origin in the first instance to being introduced with the red clover. They must be dug up, every bit of the root being removed. Seeding should be prevented.

Thistles.—The spear or boar thistle must be cut with a scythe or mowing-machine in late June or July; or the rosette should be cut with a spud early in the spring. The creeping thistle must be cut above ground early in the year (when the plants are about 6 in. high), and again once or twice as the season advances. Methodical cutting for two or three seasons is the only method by which this thistle can be destroyed.

Wild Carrot.—Like the dock this weed is frequently introduced with red clover seed. It is a very difficult weed to eradicate. This weed is more plentiful in meadows than pastures and may be decreased by close grazing for two years. It may be cut with a spud, or the aftermath may be cut with the machine or scythe to prevent this late-maturing plant ripening its seed. Fields that are badly infested with this weed should be brought under the rotation.

Hardhead or Knapweed.—This weed requires close grazing with sheep early in the spring.

Mat Herbs.—The mat herbs include ribgrass, cat's ear, daisy and other broad-leaved weeds. Sulphate of ammonia should be applied at the rate of 1½ cwt. to the acre during the summer. Fields treated in this manner should be dressed with basic slag subsequently, in order to bring about a general improvement in the herbage.

Yellow Rattle.—This weed is often very plentiful on old meadows and on leys older than three years which are continuously cut for hay. It may be reduced considerably by grazing such fields for two or three years, or by cutting the hay very early before the seed ripens. Recent trials conducted at Aberystwyth (26), show that agricultural salt applied at the rate of 6–10 cwt. to the acre, when the seedling plants are quite small (middle of April to early May), is competent completely to eradicate this weed. Dusty nitrolim (2 cwt. per acre) applied in dry weather at the end of May completely cleared the weed from plots so treated at the Harper Adams Agricultural College (22).

Bracken.—This weed, as Gordon (9) has shown, reduces grazing by supressing the natural grasses. It is also harmful to sheep, since those with heavy fleeces may be "cast" in the bracken. It spreads chiefly by its underground rhizomes. Bracken should be cut regularly until it is supressed. Trials conducted in North Wales (24) have shown that cutting about the beginning of July for two or, if necessary, three years in succession is an excellent means of eradicating the weed.

Trials in Scotland (9) show that spraying with a 5 per cent. solution of sulphuric acid early in July, and again early in August, is also a successful means of destroying this weed. The spray may injure the grasses unless the canopy of fern is moderately dense.

Gorse.—Dr. Somerville states that burning gorse in July is a very effectual means of destroying it. A certain amount of gorse is useful on exposed sheep walks both as shelter and for winter grazing. There are, however, large tracts of dense gorse in the country which should be destroyed.

Moss.—Superphosphate has a decided depressing influence on moss. Applications of superphosphate have been shown by trials conducted at Aberystwyth (25) to keep the moss in check for quite three years.

(6) **Drainage.**—Extensive pipe or tile drainage is out of the question at the present time. There are, however, large tracts of poor grass land on retentive clays that could be improved comparatively cheaply by mole drainage. The effect of mole draining on such pastures is not only to carry away excessive water but also to aerate the soil, and therefore encourage an earlier and prolonged growth of grass. The importance of mole draining has been urged upon farmers by The Food Production Department, a bulletin (30) on the subject having been recently issued. It is much to be desired that poor pastures on clay soils should be improved by this means, so that a considerable increase in the grazing available from such fields should be obtained during the coming summer, autumn and winter. Should the summer be a wet one, late applications of basic slag would be likely to add further to the amount of keep available and serve also to prolong the grazing season. In view of the shortage of feeding stuffs any measures calculated to prolong the grazing season of our pastures are deserving of earnest consideration.

IMPROVEMENT BY BREAKING THE TURF.

In the eastern and southern counties of low rainfall, and in the more essentially arable counties generally, old grass is likely to be converted into arable land proper, with only one or two-year rotation leys entering into the rotation. In the western counties, and in other cattle-rearing districts, old grass should be converted into arable land with good temporary leys; that is to say, the object would be not only to produce more crops but also to convert the poor and out-run grass into high-class leys. In both cases, however, the preparation for and selection of the first crop is a matter of prime importance. Wireworm is always a danger to the first crop taken. Potatoes, oats, wheat or rye, mustard, rape or linseed, are crops that are often successfully grown on an old turf. Spence (15) has described a method whereby excellent yields of potatoes may be obtained from grass of moderate quality on soils of good depth. The plan adopted is to set one plough to skim the turf, and this is followed by another which buries the turf to a depth of about 9 in. Useful crops of potatoes are also obtained on shallower, friable soils by ploughing before

Christmas, when winter frosts bring the soil into condition by planting time.

Trials conducted in Devon (4) have shown that good crops of potatoes may be obtained on land at about 800 ft. above sea level, which farmers have regarded as not worth cultivation, by resort to the summer fallow and the use of adequate manures. If the ploughing cannot be completed early on shallow soils, rape or mustard may be sown rather than let the land lie fallow through the summer.

Corn or potatoes would follow. Oats are perhaps more certain than wheat as a first crop on an old turf. Trials conducted at the South Eastern Agricultural College (11) show that the damage from wireworm has not been serious when a sufficiently consolidated seed-bed can be obtained. Falconer (5) has obtained excellent results by ploughing late (during March and early April); he claims that late ploughing is better than early—for he maintains that the wireworm feeds on the newly-ploughed turf, at all events until the oat plants are sufficiently established. Falconer also urges the necessity of proper consolidation which he ensures by use of steam tackle and the furrow-press, despite the fact that under his system of ploughing the preparation of the seed-bed and the seeding are continuous operations.

The conversion of poor grass into rotation land with temporary leys, which is here advocated as a means of adding to both the output of crops and the effective grazing in essentially grass-land districts of high rainfall, should be conducted on a well-thought-out plan. The manurial value of white clover and other leguminous herbs must be once more insisted upon, for it is only by turning this fundamental fact to full account that the best results are to be achieved.

It should be first decided how many acres of poor grass can be broken up annually for a period of years. The fields that will have to remain in permanent grass should then be carefully selected and manured generously. The fields destined to come under the plough would be allocated to their respective years. The fields to be taken in hand at the end of the sequence would be improved by the most appropriate of the methods previously discussed; and all of them except the first to be tackled would receive a dressing of basic slag (or of superphosphate if local experience so suggested) two or three years before their turn came to be broken. By this means extra grazing would be obtained to help tide over the period of change, and also an improved turf with valuable clover residues would be assured for the benefit of the subsequent arable crops.

Lime would not be applied until each field came under the plough. It would be used whenever convenient in the rotation, remembering that it is not essential for oats or potatoes, but valuable for barley and swedes. The effect of lime, like that of basic slag, will be cumulative; together they make clover formation a practical certainty and therefore make for enhanced fertility—provided, of course, that the subsequent leys are ploughed down before deterioration sets in.

Manures should be freely used in the rotation, and phosphatic fertilisers should be applied to the ley after the first crop of hay has been harvested, or in the second year, to ensure a good mat of white clover when the turf is ploughed down at four years old. The best time to apply slag to a temporary ley is not always an easy matter to decide. On soils which have been liberally treated in the rotation, if slag is applied immediately the corn is harvested, it reacts at once on the red clover which in consequence yields almost too heavily the first year and then dies back A later application *e.g.* in the first aftermath, tends to "hold" the red clover on the sward and reacts sufficiently quickly on the white clover.*

The period of change would, of course, require some modifications in the ordinary rotations, especially if it is contemplated to break up much poor grass in any one year. The chief necessity would be to obtain extra grazing, by all means possible, to compensate for the grass taken under the plough before a regular sequence of productive temporary leys was established.

The writer has been conducting trials on these lines for the Agricultural Department at Aberystwyth since the outbreak of the War. The Department has been fortunate in obtaining the hearty co-operation of Mr. Stanley M. Bligh, Cilmery, Builth Wells, who has successfully broken up much poor grass on his estates in Breconshire. Mr. Bligh's aim has, from the beginning, been patriotic. He has set himself to break up as much grass as possible; to obtain the maximum of crops; and, at the same time, to add to the fertility of his land, and to lose as little grazing as possible during the period of change.

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* This applies, of course, to leys put down for a period of years when late-flowering red clover would have been included in the mixture.

In Wales, as in Devonshire and elsewhere, it has been customary in the past, when old turf is ploughed down, to leave the fields through a summer fallow before any crop is taken. This procedure is not at all generally necessary. If a tilth cannot be obtained by early spring for oats it is often possible to ensure a seed-bed by June for rape, and, failing this, rye may be put down in August. If the herbage was originally very poor a crop of rape put in in June and subsequently folded on the land makes an excellent preparation for oats or potatoes the following year.

A plan that Mr. Bligh has successfully adopted is to sow a one-year seeds mixture with the oats in the spring on a newly-ploughed turf. This ensures, from one ploughing, both a crop of corn and of hay, also some valuable grazing and clover residues to be turned under. Potatoes would follow. In the case of fields from which it is proposed to take two crops of corn in succession it is a good plan to sow a certain amount of Italian rye-grass and red clover.* This will afford some useful autumnal grazing and will make for enhanced fertility, since the residues will be ploughed down about Christmas. When rye has been drilled in August, rye-grasses and clovers may be sown on the braird in the spring, after the rye has been grazed lightly over with sheep. If the rye is harvested the rye-grass and clovers will afford a subsequent bite; or a full sowing may have been put in, when the field will run on for a year or two's pasture.

It is often possible to plough more land in winter than can be dealt with during harvest time. Trials have been conducted in Cardiganshire and Montgomeryshire, and by Mr. Bligh in Breconshire, with a view to putting such land immediately down to grass. The plan adopted has been to establish "rape pastures" on the lines successfully carried out by Wibberley in Ireland. The field is ploughed about Christmas time; lime is subsequently harrowed in and a preliminary tilth is obtained in April or May, when the seedlings of annual weeds are harrowed out. The final tilth is obtained toward the middle or end of June when a full seeds mixture for a four-year ley is sown, together with a nurse of not more than 3 lb. of rape (on the better classes of soil 1½ to 2 lb. of the "nurse" is quite sufficient) to the acre, or a corresponding quantity of rape and turnips mixed.

Basic slag (6 to 8 cwt. per acre) is applied with the last harrowing when the seeds are sown. The grasses and clovers grow very quickly when sown late and in this manner. A good bite of grass, clovers and rape is obtained in the autumn and must be carefully grazed down, as it is essential on the one hand that the young plants are not eaten to the "heart," and on the other that the clovers and grasses are not allowed to become "winter proud."

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* See page 27.

The principle of the rape pasture can be extended and applied to difficult land which is unsuitable for even long rotation purposes. Many fields from which it is impossible to harvest crops can, however, be ploughed on the "one-way" system. The bagged limes can, moreover, be applied on land where burnt lime would be out of the question. Mountain and hill land, therefore, where the soil is not too stony or shallow, may frequently be converted into improved pasture land by resort to this method. Where bracken is very dense it would be well first partially to destroy it by cutting or other means; or by taking a crop of rape alone and following the next year with the rape pasture. Bracken will, however, even if partially destroyed, be sure to reappear to some extent after but one or even two ploughings. It should be hand-pulled as it comes up during the first autumn and spring—work which can be well performed by a gang of women. If subsequently the field (and it will be an improved herbage) is grazed with cattle as well as sheep the bracken will not become serious for a number of years.

One ploughing will not usually prove sufficient to eradicate gorse, for even if the roots are hand-dug the seedlings will reappear. Gorse land, however, whenever the field is all workable, should always go through the rotation. Such land is usually moderately fertile and capable of producing excellent crops of oats. Farmyard manure and lime applied during the arable period, followed up by adequate grazing on the improved ley or pasture, that will end off the rotation, will ensure freedom from gorse for a number of years.

The fact that good swards can be obtained both in corn and under rape on a freshly-ploughed turf is of considerable importance. Breaking up poor grass, therefore, is not only to be regarded as a means of introducing a new and extended system of rotation husbandry, but may also be employed with a view to establishing improved permanent grass. This method would seem, moreover, to have some very decided advantages over top dressings, renovating mixtures, and so on. For instance: (1) lime and basic slag can be incorporated with the soil, lime under these conditions exerting no retarding influence; (2) the field is cleared of weeds, and moss destroyed; (3) the soil is completely aerated; and (4) wild white clover and other essential plants are given a certain hold on the ground from seeding. It is, of course, a method only to be adopted on friable soils of such a nature that a reasonable tilth can be assured; when these conditions are fulfilled more certain results are to be looked for than from surface treatments.

When poor grass is broken up with a view to extending the area under the plough, and establishing a sequence of high-class temporary leys, it is of the utmost importance that the rotation should not take too much from the land; consequently, manures should be applied in proportion as crops are wholly removed. Fertility may, and should, be husbanded by ploughing in plant residues; hence the suggestion already made of sowing rye-grass and clovers with all corn. It may be thought that this plan, and also that of putting down a one-year mixture, would tend to clover sickness in the subsequent and all-important temporary ley. This is not, however, a risk that need be seriously considered in the case of land which has not been broken for decades, and which has probably not produced a plant of red clover for a generation or more. If there are good reasons for fearing clover sickness, then the plan largely adopted in parts of Merionethshire may be given a trial. This consists in sowing turnip seed on the oat braird in the spring, so affording a measure of autumn keep and plant residues for the plough.

It may be added that rape and turnips mixed make an ideal "nurse" for "seeds" when put down at the end of a rotation which has yielded several crops of corn. This is a common practice amongst some farmers on Exmoor and on the Welsh hills, where it gives uniformly good results. It is, however, a practice which is very localised, but should be much extended. There are two distinct advantages to be gained by the use of rape and turnips as a "nurse" over corn: (*a*) the final crop is returned to the land for the benefit of the "seeds"; and (*b*) "seeds" with rape need not be sown until June. This gives a prolonged opportunity for cleaning the land; on poor, non-calcareous soils young "seeds" are often completely smothered by such weeds as spurrey and sheep's sorrel.

It should be pointed out that the maximum life of a ley compatible with productivity varies considerably from field to field and from locality to locality. The usual practice where the long rotation is in vogue is, however, to leave the sward down just as long as it will yield any sort of bite. That is to say, it is ploughed down at just the wrong time—when it is completely run out, and when clover residues, and residues from the turf generally, are at their minimum value.

It is realised in many localities that fields do not sward well, and an endeavour is therefore made to take the rotation gradually round practically the whole farm. This practice, however, is not correlated with the use of efficient seeds mixtures and frequently entails leaving the leys down from six to twelve years; and selection in the wrong direction is exercised, the outrun leys falling to the plough. The experience of the writer in many localities, which are only capable of producing poor grass, suggests the four-year ley as being of good average duration upon which to base a working plan.

The amount of permanent grass arranged for must therefore to some extent turn upon the size of the farm; the plough can, however, be accelerated in its journey round the leys if one or two fields are ploughed each year and put straight down to rape pastures or sown with corn and a seeds mixture. It is not, moreover, necessary or desirable that the poorest fields should be made to yield at least two straw crops and roots every time they come under the plough. It is perhaps remarkable that on inaccessible fields grass rotations have never been practised. A grass rotation would consist of putting a field down with rape as a "nurse," ploughing and re-seeding under rape before the first signs of deterioration set in, and repeating this operation on every occasion when the sward ceased to "hold." It would be found that under the influence of accumulated fertility (no crops being removed), the sward would "hold" for longer periods under each successive ploughing, basic slag being regularly used, and lime at suitable intervals. This suggestion has been taken up by a farmer in Cardiganshire, and the second "sward" has now been successfully established.

There is one very important practical point in connection with the more intensive methods of managing grass land here advocated. A very large proportion of the ploughing, both in the first instance and when the new leys came to be broken, could be undertaken in bad and wet weather, and in almost every month of the year. Rape pastures can be prepared for at odd times when the teams would otherwise be idle; and it is often an advantage to break up old turf during wet periods.

Crops, moreover, would not have to be harvested on the land which had been ploughed. There is no doubt, therefore, that an enterprising farmer, even with the teams and tackle at his disposal under his present extensive system, could start on the more intensive plan with very little risk or inconvenience. He would, by so doing, not only add to the nation's cereal supplies but very soon find that he could keep a considerably increased head of stock on his farm.

The general principles outlined are, of course, applicable in districts where the four-course rotation is the practice. In such districts the rotation is usually confined to a certain part of the farm, the rest being permanent grass proper. Porter (14) has advocated the methodical breaking up of this permanent grass. He would take the rotation over a larger proportion of the farm, and would substitute the three-to-four-year ley for the one-year " seeds " in compensation for the permanent grass broken up.

In districts where a four-year ley is to be adopted instead of a longer one, the risk of damage by wireworm is, of course, less than formerly; where, however, the longer ley is substituted for the shorter this risk would possibly be aggravated. From the enhanced fertility point of view, however, Porter's plan would seem to have everything to recommend it. and could certainly be adopted to great advantage on many farms.

There are some poor grass fields which should be farmed on the four-course rotation. Such fields are those at present carrying a certain amount of rushes; but which at the same time are not in great need of drainage. If such fields were ploughed and put down to grass after but one rotation the rushes would completely dominate the field, becoming far more plentiful than formerly; whereas, if kept under the four-course rotation for a number of years, the rushes would gradually be extirpated.

The principles laid down in this section are deserving of the earnest consideration of the War Agricultural Committees or of landowners and farmers who have the use of motor tractors. It is deplored on all sides that the ploughing season automatically ceases in March or early April. Poor and especially outrun grass can, however, be broken practically all the year round; and, as already stated, if ploughed before June rape or rape pastures can be sown, if before August rye, and if later than August oats the following spring. Committees contemplating taking this action should, however, arrange that clover and rye-grasses are sown with a fair proportion of the oats forthwith. The methods of improvement discussed in this section have assumed that in every case reliable seeds mixtures will be employed. It will be necessary, therefore, to consider briefly the question of selecting an adequate mixture and the purchase of genuine seed.

SEED MIXTURES.

Sward formation takes place under the combined influence of the species sown and of those that spring up naturally (18). A rotation ley is entirely dependent, for valuable species, on the plants that are sown, for only arable-land weeds and such worthless grasses as Yorkshire fog and soft brome will make an indigenous appearance during the short period such leys are left down. A temporary ley should, if the management has been good, derive some support from valuable indigenous species. A permanent pasture will in its adult stage, at all events, be almost wholly dependent on indigenous species. When selecting seed for temporary leys and permanent grass, therefore, local knowledge is of prime importance, not only because the influence of indigenous species is profound in proportion to the length of time fields are left down, but because a great number of the so-called "natural" or "permanent" grasses and clovers of commerce do not function, in many localities, as either natural or permanent plants. It is not surprising that this should be the case when it is realised that nearly all the "permanent" seeds supplied by seedsmen are imported into this country from overseas.

Speaking quite generally, the real value of the commercial permanent grasses and clover seeds is not for the purpose of establishing an adult turf of these plants; rather are they valuable because by their judicious use it is possible to tide over that difficult period in the life of every prepared field between the failure of the rye-grasses and clovers and the establishment of an indigenous sward. Paradoxical as it may appear, therefore, the "natural" grasses are just as and often more valuable for the formation of temporary leys than for permanent grass. A field put down for 20 years and upwards can be carefully nursed for a few early years without seriously affecting its aggregate productivity; a temporary ley on the other hand must, if it is to justify itself, yield uniformly well during its whole short life. The above facts cannot be too strongly insisted upon, for in many localities temporary leys of three years and upwards are put down without the inclusion of any plants except rye-grasses and clovers. It has, furthermore, usually been just such leys that have been allowed to run on, so that the insufficient seeding of temporary leys has in the past been largely responsible for the present acreage of outrun grass in the country. It has not only been a misguided sense of economy that has contributed to this under-seeding, but many farmers have learned to regard even cocksfoot and timothy as being "natural" or "permanent" grasses and therefore not suitable for inclusion in temporary mixtures. The seedsmen are themselves largely responsible for this state of affairs, for all the species other than the rye-grasses are frequently listed as "natural" or "permanent." There are, moreover, covenants in leases to-day which stipulate for the sowing of a bushel of rye-grass.

In drawing up seed mixtures it is, in reality, only necessary to differentiate between (*a*) one-year leys, (*b*) two- or three-year leys, and (*c*) leys for over three years, including permanent grass, remembering that the essence of farming grass on the temporary ley basis is to plough down a good turf.

It does not follow, however, that the mixtures necessary under the last of these categories should be very complicated. The essence of a good mixture is the inclusion, in sufficient amount, of species that will be certain to succeed, and the rigid exclusion of all others. A species has not succeeded if several pounds of expensive seed only contribute a few plants scattered over a field. In the interests of sound grass management and economy there is nearly as much need for the simplification and cheapening of elaborate mixtures as for reinforcing the old-fashioned rye-grass sowings. Some cheapening is the more desirable since it is often advisable, if not absolutely necessary, to include wild white clover in a mixture.

It may be helpful to give a few short notes on the commoner grasses and clovers supplied by seedsmen, in order that farmers may be in a better position to decide for themselves not only which species to include but also which to exclude from their mixtures.

The Grasses.—*Italian Rye-grass.*—At Cockle Park (21) perennial rye-grass is a heavier yielder than Italian, and Findlay (23) finds that neither a large nor small amount of Italian rye-grass included in mixtures for three-year leys adds to the hay crop. Evidence suggests, however, that on some soils this grass does add to the hay yield in the first year, but if included in mixtures 2–4 lb. per acre would be ample.

Perennial Rye-grass.—This is a very valuable grass, yields well in the first year's hay on practically all soils, and can be cut later than other grasses. On many poor soils it does not persist after the second or third year in any quantity. On good land it will make an indigenous appearance but should always be sown—a small seeding (about 8–12 lb.) will, however, produce as much hay as a large sowing.

Meadow Fescue.—This grass is abundant on many of the best grazing fields in the country. It is, however, not a success in seeds mixtures except on some good soils, and is undoubtedly a grass that could frequently be discarded without in any way detracting from the resulting herbage. Findlay (23) finds that it is unable to compete against rye-grass the first year or against cocksfoot and timothy the second year.

The Fine-leaved Fescues.—These include the "sheep's fescue," "hard fescue," and "red fescue" of commerce. The indigenous fine-leaved fescues (especially red fescue) are valuable bottom grasses. In all districts studied by the writer, however, no benefits have ever been observed from including the commercial seed of these fescues in mixtures. Under proper management the locally indigenous species will come into the herbage after about three or four years.

Tall Fescue.—This certainly succeeds better on poor soils than meadow fescue, but does not offer many advantages not also possessed by cocksfoot.

Meadow Foxtail.—Where meadow foxtail succeeds it is a most valuable grass. It is indigenous to good soils, but seldom justifies itself from seeding except on highly fertile fields or fields liberally dressed with farmyard manure for a period of years.

Golden Oat-grass.—This grass persists very well from sowing on many classes of soils. It yields heavily in the hay crop, especially in the third or fourth year, and produces abundant growth in September. It competes well against cocksfoot, which it tends to prevent from becoming coarse and tufted. The seed is very expensive, and consequently it should not be included in mixtures before the grass has been tested on a small scale in the locality.

Crested Dog's-tail.—This is a very valuable grass for poor soils, upon which it contributes in appreciable amount to the hay. It comes in naturally at about the fourth year, but its appearance is hastened by sowing the commercial seed. It should be kept well grazed in order to prevent the formation of the wiry flower stems. It competes well against bent.

Tall Oat-grass.—This grass often makes an indigenous appearance on a newly-broken turf, and on some classes of permanent grass. On many soils it is a bitter grass not relished by stock. In most cases it should only be included in mixtures if hay is to be taken every year for the duration of the ley, when it will add to the hay crop considerably in the first and succeeding years.

Sweet Vernal Grass.—This is a valuable early grass on poor soils, upon which it usually makes an early indigenous appearance. It is probably not worth sowing, however, since success from the expensive seed is very uncertain.

The Meadow Grasses.—Both of these are capable of a rapid and abundant indigenous appearance on soils that respectively suit them. Rough-stalked meadow-grass, although primarily a grass of fertile land, succeeds well on poor soils in districts of high rainfall, where it competes satisfactorily against bent, and, since the commercial seed makes its entry more certain, is usually worth including in mixtures. It is doubtful if smooth-stalked meadow-grass is ever worth sowing, even on poor soils, since crested dog's-tail is usually more certain.

Timothy.—This is an indigenous grass on some wet situations and fertile soils. A smaller bulbous form is natural to the Cotswolds and other calcareous districts. The commercial seed ensures a good development of this grass by the second year and for a few subsequent years. It should be included in all seeds mixtures in rainy districts where it succeeds even on thin soils.

Cocksfoot.—Under proper management cocksfoot is perhaps the most valuable grass for temporary leys on poor soils. It is particularly useful in districts where perennial rye-grass falls off after the first year, since it attains maximum development in the second or third year, and remains productive for four or five seasons. It does not come in naturally in many districts, and in districts where it makes an indigenous appearance is far more plentiful under meadow than pasture conditions. When used as a pasture grass it must be sown in large amount and be kept well grazed; it should never be allowed to ripen its seed. It is particularly valuable on sheep farms, being one of the earliest grasses to afford keep in the spring; it also picks up rapidly on the aftermath.

The Clovers.—*Red Clover.*—Red clover is put on the market either as "broad red clover," "cow-grass," "perennial red clover," "single-cut cow-grass," or "late-flowering red clover." There is no real distinction between many of the "cow-grasses" and "broad red clover." "Late-flowering red clover," however, appears to be a definite variety. It is a taller and more bulky plant than broad red, it flowers and matures later, and it does not produce quite as much aftermath. The available evidence suggests that late-flowering red clover "holds" on the ground longer than other varieties; the writer has found that it often yields well in a second year's hay crop and frequently contributes appreciably to the herbage in the third year.

Red clover seed is not only home grown but is imported into this country largely from Chile, France (Brittany), Canada, Russia, and other countries. Trials have been conducted at Leeds (19) as to the value for one-year leys of red clover obtained from different sources. It was found that the largest bulk of hay was obtained from English single-cut cow-grass, Canadian, United States and Russian samples. The clovers which gave the best autumn stubble grazing after the corn crop had been removed were Chilian, New Zealand and English cow-grass. The greatest weight of aftermath was obtained from Chilian, English, New Zealand and Canadian.

Very few trials have been conducted to establish which clovers are the best for the formation of longer leys. Trials at Aberystwyth, however, suggest that the home-grown stocks certainly "hold" on the ground longer than foreign clovers; of the foreign stocks those from Brittany appear to "hold" better than others. More recent trials at Aberystwyth show that Chilian clover produces the best stubble grazing, thus confirming the Leeds results, but at high elevations it does not stand the winter well and is certainly not a lasting plant. The writer's general experience has been that when clovers make excessive growth the first autumn, and run into flower and become "winter proud," they do not yield heavy crops of hay or "hold" on the ground; and there is little doubt that Chilian clover does produce more autumn growth than other clovers. In mid-Wales the best results have certainly been obtained with Welsh-grown clovers, and there seems little doubt that a home-grown sample of late-flowering red clover should form the bulk of the red clover used in mixtures for leys of two to four years' duration. Chilian clover is admirably suited for sowing with corn crops to give an autumn bite before the stubble is ploughed down, but should probably not be used even for that purpose at elevations above about 600 ft.

Alsike Clover.—In districts where wet and cold winters are the rule alsike is frequently more hardy and lasting even than late-flowering red clover. It succeeds well on peat; its inclusion in all mixtures safeguards a "stand" of clover.

White Clover.—The ordinary commercial seed of white or Dutch clover is now generally realised not to give a lasting plant of white clover. The most that can be expected from its inclusion in mixtures is an early appearance of white clover, thus perhaps making good the interval before the local wild white clover comes in indigenously. In many districts white clover is a strongly indigenous plant which on fields liberally treated with slag and lime at regular intervals may make a comparatively early natural appearance; and it will sometimes contribute as much as 20 per cent. to the herbage (although no white clover has been included in the mixture) by the fourth year. In other districts white clover is not a strongly indigenous plant and will not contribute appreciably to the herbage, despite applications of phosphatic manures, till after the lapse of a number of years. It is on such fields that wild white clover should always be included in the mixture.

The rapidity with which wild white clover establishes itself from seeding on a prepared ley adequately manured, in comparison with the commercial white Dutch and the unsown locally indigenous plant, is admirably exemplified in the table hereunder.

TABLE I.

Showing the number of plants of White Clover per acre on 20th November, 1916, on two fields sown in plots in the spring of 1915. One hay crop had been taken, and the estimates were consequently made on the first aftermath.

A.—Field of 600 ft. Elevation.

Plot 1.	1 lb. Commercial White Dutch included in mixture gave ..	75,000 plants per acre.
,, 2.	½ ,, Wild White included in mixture gave	94,000 ,, ,,
,, 3.	2 ,, Wild White included in mixture gave	106,000 ,, ,,
,, 4.	No White Clover included in mixture gave	31,000 ,, ,,

B.—Field of 800 ft. Elevation.

Plot 1.	¾ lb. Commercial White Dutch included in mixture gave ..	41,000 plants per acre.
,, 2.	2 ,, Commercial White Dutch included in mixture gave ..	87,000 ,, ,,
,, 3.	¾ ,, Wild White included in mixture gave	158,000 ,, ,,
,, 4.	No White Clover included in mixture gave	37,000 ,, ,,

Both fields had received a liberal dressing of phosphatic manures with the corn in which the "seeds" were sown.

Jenkin (12) has furthermore shown that 30 months after sowing 2 lb. per acre of wild white clover, nine times more ground was covered with white clover than upon plots where the ordinary commercial seed had been used. The value of wild white clover may now be taken as an accepted fact (7, 8, 13 & 14), and it is much to be hoped that larger harvests of this important seed will be secured in future. The Food Production Department have issued a bulletin (31) giving particulars as to the best means of harvesting the seed, and there is no reason why more farmers should not secure their own supplies of the seed. The demand for wild white clover probably will, and certainly should, become greater as more poor grass land is ploughed and the value of the good temporary ley is better appreciated.

Yellow Suckling Clover.—This clover is an indigenous plant which on some poor soils contributes (unsown) substantially to the herbage by the fourth year. If reliable seed is used (free from excess of "hard" seed), inclusion in the mixture hastens its appearance.

Kidney Vetch.—The kidney vetch is a variable plant which justifies its inclusion in some localities, but should be subjected to local trials before being largely used.

Bird's-foot Trefoil.—The writer, Middleton, and others have commented upon the manner in which this plant responds to basic slag. It is valuable on poor soils, and, consequently, seed of the wild variety should be given a trial in mixtures. Seed of the wild plant is a common impurity in genuine wild white clover; it is recovered by at least one seed firm and put on the market as such.

Miscellaneous Plants.—*Chicory.*—Chicory has proved itself to be the most generally successful of all the plants other than grasses or clovers for herbage purposes. It yields heavily in the hay crop and affords early and late keep for sheep.

Types of Seed Mixtures.—It may now be assumed that the farmer has decided which species to exclude from his mixture. He must next ascertain how he stands as to white clover and other leguminous herbs. The essential thing is to have a turf of leguminous herbs to plough down at the end of the ley. If a sufficiency of white clover or of yellow suckling clover or bird's-foot trefoil from the locally indigenous (unsown) plants can be relied upon at the end of four years, it is not absolutely necessary that the wild white clover should be included in the mixture. If, however, this is not assured, wild white clover should at all costs be included, and in any event a small amount added to the mixture tends to accelerate sward formation and prevent the entry of weeds. The inclusion of wild white clover necessitates a considerable outlay, and consequently the mixture must be cut down to the minimum in other directions. The type of mixture successfully employed by Gilchrist (7) for a three-year ley has been (in lb. per acre) :—

16 lb.	Perennial Rye-grass.
10 „	New Zealand Cocksfoot.
4 „	Timothy.
4 „	Single-cut Cowgrass.
1½-4 „	Wild White Clover.

The wild white clover was of course assisted by basic slag, 10 cwt. (39 per cent. phosphates) being applied in the early winter after the nurse (barley) was harvested. This mixture on the heavy soils at Cockle Park gave, on the average, over 2 tons of hay per acre in each of the three years. It will be noted that none of the commercial bottom grasses were included in the mixture. Investigations on grass land in Wales have, however, shown that a good plant of white clover actually hastens the appearance of such valuable grasses as the indigenous red fescue and the meadow grasses. Trials conducted by the writer in Wales also suggest that on soils where white clover makes a partial natural (unsown) appearance, ¾ lb. wild white clover included in the mixture, amply assisted by basic slag, is sufficient to ensure an abundance of white clover to plough down at the end of four years.

After extensive trials in Scotland, Findlay (23) recommends the following type of mixtures for one year's hay and two years' pasture; it is assumed that seeds of good quality are used.

	Per acre.			
	a.	*b.*	*c.*	*d.*
Perennial Rye-grass ..	½ bush.	¼ bush.	½ bush.	10 lb.
Cocksfoot	6–7 lb.	8–12 lb.	7–8 lb.	5–6 „
Timothy	3–4 „	3–1* „	4–5 „	6–7 „
Crested Dog's-tail	—	1* „	—	—
Rough-stalked Meadow-grass	—	—	1 „	1 „
Late-flowering Red Clover	1½ „	2 „	1 „	2 „
Broad-leaved English Red Clover	2 „	2 „	2 „	—
Alsike Clover	1 „	—	1 „	1 „
Kidney Vetch	—	1–2* „	—	—
Wild White Clover ..	¾ „	¾ „	¾ „	1 „

(*a*) For ordinary medium soils in the N.E. of Scotland.
(*b*) For light, dry soils. (*c*) For heavy soils.
(*d*) For peaty soils. * *For the lightest soils.*

The type of mixtures now advocated by the writer, for 3–5-year leys, and successfully employed in mid-Wales, are as follows :—

	Per acre.	
	1.	2.
Perennial Rye-grass	10–14 lb.	—
Cocksfoot	6–10 ,,	10–16 lb.
Timothy	2–3 ,,	4 ,,
Crested Dog's-tail	1 ,,	1 ,,
Broad Red Clover	1–2 ,,	1–2 ,,
Late-flowering Red Clover	3–4 ,,	4–5 ,,
Alsike Clover	2 ,,	2–3 ,,
Wild White Clover (according to local conditions)	0–¾–2 ,,	0–¾–2 ,,
Chicory	2–3 ,,	3–4 ,,

The broad red clover is included chiefly for the benefit of the sheep during the first autumn and winter after the corn has been harvested; maximum sowings of perennial rye-grass are included for the same purpose; and it is sometimes found advisable to include 2 lb. of Italian rye-grass for the same reason. In future experimental trials a small amount of rape (1½ lb.) will be also added. Since farmers in sheep districts are so often driven by necessity to graze their young seeds, the mixtures devised have as far as possible to safeguard the important plants against this bad practice. The only other plants at all generally advocated by the writer for the province in which he is adviser are yellow suckling clover* (2 lb., in cases where the farmer cannot be induced to try wild white clover), and rough-stalked meadow-grass.

The second (cocksfoot) mixture has proved very successful in experimental trials and with the few farmers who have adopted its use. On one farm 14 lb. of cocksfoot was sown with timothy alone and a generous allowance of late-flowering red clover, gave an excellent yield of hay in both the first and second years, and looks very promising for the third (coming) season. The value of cocksfoot mixtures lies in the fact that when sown without competition with rye-grasses the cocksfoot itself and the late-flowering red clover bulk excellently in the first year's hay.

It is important that farmers should realise that equally large crops of hay can be harvested in the first year from mixtures in which the rye-grasses are far short of the antiquated bushel to the acre, or even when these grasses are totally excluded. The produce from such mixtures in the second and subsequent years is, furthermore, on many classes of poor soil out of all comparison to the rye-grass clover seedings.

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* The seed of yellow suckling clover must be purchased with care, since it often contains over 30 per cent. of "hard" seed.

Table II. below, showing the weight of hay harvested per acre in the first year from four plots sown with the mixtures indicated, is given in support of the above statement.

TABLE II.

Showing the type of mixture used in lb. per acre and the weight of hay harvested in cwt. per acre from the 1st crop on four plots at Waun Fawr, Cardiganshire.

LARGE SOWING OF RYE-GRASSES.		SMALL SOWING OF RYE-GRASSES		ITALIAN RYE-GRASS ONLY		WITHOUT RYE-GRASSES.	
Plot 1	*lb.*	*Plot 2*	*lb*	*Plot 3*	*lb*	*Plot 4*	*lb.*
Rye-grasses	18	Rye grasses	9	Italian Rye-grass only	2	Cocksfoot	12
Cocksfoot	2	Cocksfoot	6	Cocksfoot	10	Timothy	1
Timothy	1	Timothy	3	Timothy	2	Tall Oat	4
Hard Fescue	1	Meadow Fescue	4	Tall Oat	2	Tall Fescue	6
Broad Red Clover	3	Rough stalked Meadow grass	2	Tall Fescue	4	Sheep's Fescue	1
Alsike Clover	1	Late flowering Red Clover	3	Crested Dog's tail	2	Rough-stalked Meadow-grass	1
Dutch Clover	1	Alsike Clover	4	Late flowering Red Clover	3	Smooth-stalked Meadow-grass	1
Trefoil	1	Wild White Clover	½	Alsike Clover	2	Crested Dog's-tail	2
		Trefoil	2	Wild White Clover	2	Late-flowering Red Clover	4
		Chicory	2	Yellow Suckling Clover	3	Alsike Clover	2
				Yarrow	½	Yellow Suckling Clover	1
						Trefoil	1
						Chicory	4
						Yarrow	¼
WEIGHT OF HAY PER ACRE							
40·2 cwt.		41·2 cwt		60 4 cwt.		56·0 cwt.	

It should be noted that neither the hard fescue, sheep's fescue, meadow fescue, tall fescue, trefoil, yellow suckling clover, white clover, or smooth-stalked meadow-grass contributed appreciably to the hay on any of the plots. The mixtures were designed solely for experimental and comparative purposes, and should not be followed by farmers. Equally good results were obtained from the simplified mixture advocated for practical men. It must be explained that the yields of hay obtained in mid-Wales last season (1916) were exceptionally high. It is, however, a comparison of the produce from the several plots that is instructive. Trials conducted by Hendrick and Findlay (10) on The Feeding Value of Pastures in Scotland have shown that for grazing purposes heavy seedings of rye-grass are not superior to lighter seedings or to a mixture without rye-grass. The yields of hay have, however, been slightly heavier when rye-grass in reasonable amount has been included in the mixtures.

THE PURCHASE OF SEED.

This question has been fully dealt with by the writer in an article in the Board's *Journal* (17). It is here only necessary again to emphasise two commonly neglected facts. Gilchrist has shown that New Zealand cocksfoot is the most suitable for temporary leys in northern England, "as it produces more leafy herbage and is about ten days later in maturity than cocksfoot from other sources." This is an exceedingly important point, for its later maturity fits in exactly with the late maturity of late-flowering red clover. It is also essential for the future success of the ley that cocksfoot should be cut before it becomes over-ripe.

From what has previously been said as to the fine-leaved fescues, in addition to the success of New Zealand cocksfoot and home-grown red clovers, it is apparent that the country of origin of the seeds of herbage plants is a question that should be made the subject of carefully conducted trials all over the country.

Temporary leys are frequently ruined at their inception by the introduction of noxious weeds with the seed mixtures. This is a form of negligence all too common even amongst farmers whose management is otherwise excellent—that is, by farmers who will be certain to have obtained a clean seed-bed on land in good heart and who may be depended upon not to stint the essential fertilisers.

The chief sources of noxious weeds are the rye-grasses, since a bushel of uncleaned seed will frequently introduce enough Yorkshire fog and soft brome to make an unproductive ley a certainty. This in itself is a strong argument in favour of reducing the use of rye-grasses. The red clovers, usually sown in large amounts, are also responsible for the fouling of innumerable leys, since they are commonly carriers of wild carrot and dock, as well as of the destructive dodder. In times of peace there is no justification for sowing foul seed; in time of war it is one of the numerous ways open to unthinking civilians of helping the enemy.

SUMMARY OF CONCLUSIONS.

(1) An endeavour has been made in this paper to show that a broad view should be taken as to the position of our grass lands in relation to production.

(2) The intimate connection that exists between well-managed grass land and fertile arable land has been insisted upon.

(3) Basic slag and lime have been shown to exert a profound influence in the spread of white clover and other leguminous plants. The beneficial effect derived from the use of these substances, together with the sowing of wild white clover (when necessary), is cumulative, and under proper management reacts on the fertility of the whole farm.

(4) The extended use of basic slag, lime and wild white clover is therefore fundamental to the successful initiation of plans designed to stimulate production by the adoption of progressive and more intensive methods of agriculture in backward pastoral districts of low average fertility.

(5) The improvement of grass land may often be better achieved by the adoption of altered methods of farming than by resort to top dressings and other surface treatments only.

(6) Well conceived plans to extend the acreage under crops in grass districts of high average rainfall should not seek to add only to the arable area, but should also be directed to a regular sequence of highly-productive temporary leys. Indiscriminate extension of the arable area in such districts can only, as in the past, make for subsequent infertility.

(7) It has been shown that it is possible to do much of the ploughing necessary to convert poor grass into rotation land with productive leys, with the additional object of improving permanent grass as such, both during the late spring and summer and in adverse weather during winter.

There is, in consequence, in many districts considerable scope for the employment of motor tractors over a greatly extended period of the year, apart from the preparation of land for the sowing of autumn wheat.

(8) The selection of suitable mixtures is of the utmost importance in connection with farming on the temporary ley basis. At one end of the scale it is necessary that the rye-grass clover mixtures should be reinforced, and at the other end there is considerable scope for simplification in the complicated mixtures often employed.

NOTE.—The writer of this article, while taking full responsibility for the views expressed, and for the accuracy of the facts stated, desires to thank his colleagues in the Technical Section of The Food Production Department of the Board for many valuable suggestions and much useful information.

REFERENCES.

1. AMOS, ARTHUR.—Converting Pasture to Arable Cultivation: *Jour. Board Agric.*, Vol. xxii, No. 11, Feb., 1917.
2. ARMSTRONG, S. F.—The Botanical and Chemical Composition of Pastures and Meadows: *Jour. Agric. Science*, Vol. ii, Part 3, Dec., 1907.
3. CARRUTHERS, WM.—The Composition of some of the Famous Pastures of England: *Jour. Roy. Agric. Soc. Eng.*, Ser. 3, Vol. i, 1890.
4. DUTTON, F. V.—The Utilisation of Waste Land: *Jour Board Agric*, Vol. xxiii, No. 7, Oct, 1916.
5. FALCONER, JAS.—The Ploughing up of Grass Land and its Subsequent Treatment: *Jour. of the Farmers' Club*, March, 1917.
6. FREAM, W.—The Herbage of Old Grass Lands: *Jour. Roy. Agric. Soc. Eng.*, Ser. 2, Vol. xxiv, 1888.
7. GILCHRIST, PROF. D. A.—Wild White Clover: *The Farmer and Stock-breeder Year Book*, 1917.
8. ——————Trials of White Clover: *Jour. Board of Agric.*, Vol xxii, No 11, Feb, 1916.
9. GORDON, G. P.—Bracken (*Pteris Aquilina*), Life History and Eradication: *Trans High. and Agric. Soc. of Scot.*, 5th Series, Vol. xxviii.
10. HENDRICK, PROF. J., and FINDLAY, WM. M.—The Feeding Value of Pastures. *Trans High. and Agric. Soc of Scot*, 5th Series, Vol. xxvi.
11. HUTCHINSON, C.—An Experiment in Breaking up and Cropping Old Grass Land: *Jour. Board of Agric.*, Vol. xxiii, No. 12, March, 1917.
12. JENKIN, T. J.—Ordinary White Clover Seed *versus* Wild White Clover Seed: *Jour. Board Agric.*, Vol. xxiii, No. 12, March, 1917.
13. M'ALPIN, PROF. A. N.—Wild White Clover: *Trans. High. and Agric. Soc of Scot*, 5th Series, Vol. xxvii.
14. PORTER, JOHN.—A Big Stride in Agricultural Improvement: *The Hereford Times.*
15. SPENCE, MAJOR D. A.—Potatoes: *Jour. of the Farmers' Club*, Jan., 1917.
16. STAPLEDON, R. G.—Rape Pastures: *The Jour. Univ. Coll. of Wales*, Vol. viii, 1915.
17. ——————Report on Seeds Purchased in Central and S. Wales, Seasons 1915–17: *Jour. Board Agric.*, Vol. xxiii, No. 9, Dec., 1916.
18. —————— and JENKIN, T. J.—Pasture Problems: Indigenous Plants in Relation to Habitat and Sown Species: *Jour. Agric. Science*, Vol. viii, Part 1, Sept., 1916.
19. UNIVERSITY OF LEEDS, Bul. No. 57: Report on Nationalities and Varieties of Red Clover.
20. COUNTY OF NORTHUMBERLAND, Bul. Nos. 8 & 22: Guide to Experiments.
21. ARMSTRONG COLLEGE, Bul. No. 15: Grass and Clover Seeds.
22. HARPER ADAMS AGRICULTURAL COLLEGE: Joint Report for 1914.
23. THE NORTH OF SCOTLAND COLLEGE OF AGRICULTURE, Bul. No. 18: Report on Grass Seed Mixtures, 1907–13.

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